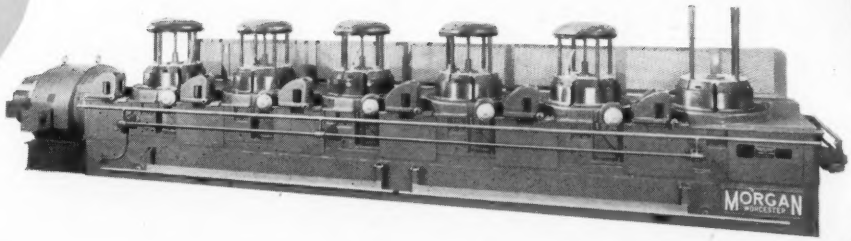
WIRE AND WIRE PRODUCTS

DECEMBER 1956

Wishing you
A Very Merry Christmas



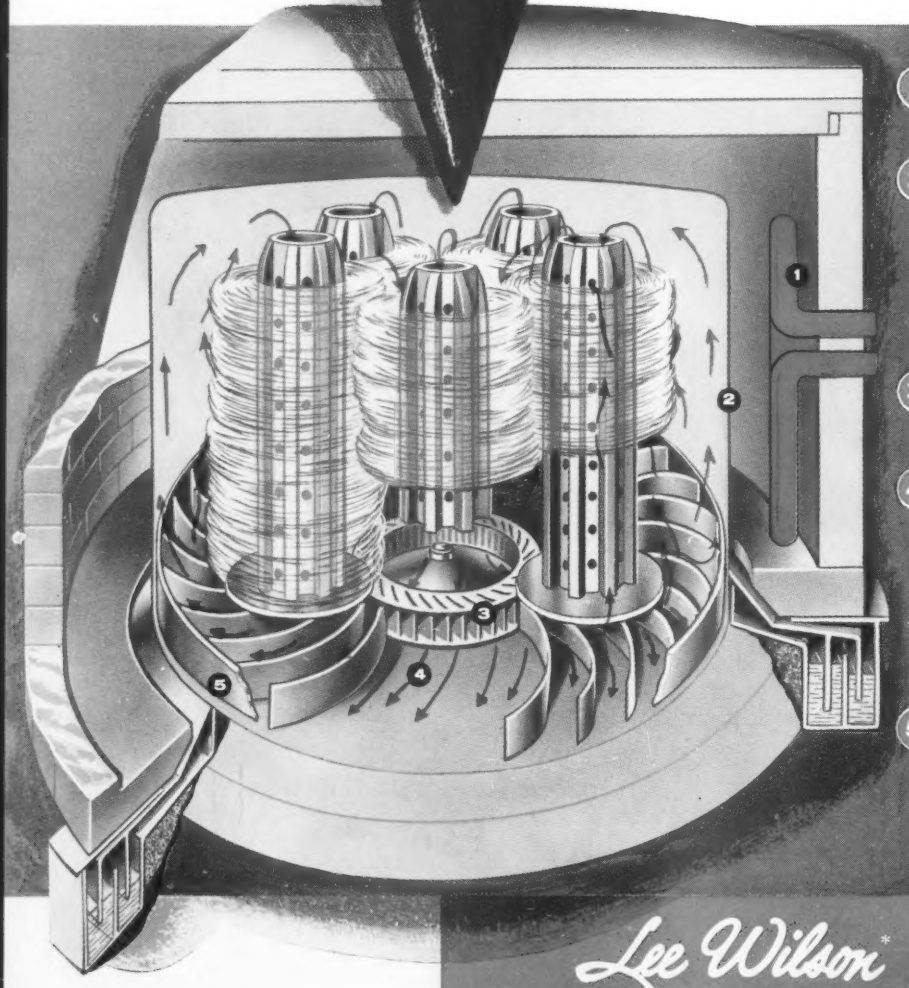
MORGAN-CONNOR *Wire Machines*
Morgan Construction Company
Worcester, Mass.

WM99

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

WHAT IS High convection Wire Annealing?

• It is a system developed by Lee Wilson to get the greatest annealing yield out of the smallest floor space and the highest uniformity of physical properties at the least cost. Here is how it works —



1 THE SOURCE OF HEAT

"O" type radiant tubes with inputs up to 5 million Btu. per hour.

2 CONVECTION TRANSFER

Gases are circulated from the fan at velocities over 3000 ft. per minute over the inner cover surfaces from which these gases are heated by convection transfer. This velocity is many times greater than has been available in older designs, which makes it possible to utilize the extremely high heat inputs available.

3 THE ENERGY SOURCE

7½ to 25 HP fan drives, delivering 5000 cfm. to 12,500 cfm. of gas circulation.

4 SECONDARY CIRCULATION

The velocity of the gas movement from the fan is at terrific speeds which aspirate a flow of gases down through the center of all of the stems in the charge. Performance checks indicate that the secondary gas movement amounts to as much as 50% of the primary fan capacity, which brings the inside of each stem of wire up to temperature in the same time as the outside surfaces of the coils.

5 ENERGY CONVERSION UNIT

The diffuser assembly, where the velocity pressures from the fan are converted to static pressures at twice the normal conversion efficiency of other furnaces.

Lee Wilson* ENGINEERING COMPANY, INC.

20005 WEST LAKE ROAD • CLEVELAND 16, OHIO

HIGH CONVECTION ANNEALING FURNACES

MAKE THE BEST METALS BETTER

Thank You Mr. Wire Man

We, the . . . "Men of Standard Industrial" send our "Thank You" to our many friends and friends-to-be.

Your loyalty and cooperation have enabled us to close another very successful year.

John Mouff

Earl Bowers Jr.

Bruce Lienau

Kent Bosworth

George E. Sloan

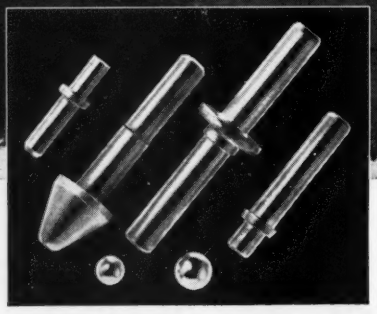
We wish you one and all a very Merry Christmas and a most prosperous New Year.

Standard Industrial COMPOUNDS CO., INC.

FRANKFORT, ILLINOIS

(A suburban Chicago area city)

TELEPHONES: 2131 — 2141



COLD-HEADED FROM STEEL WIRE

At the right is a group of parts cold-headed by The Bassick Company, Bridgeport, Conn., from Bethlehem Cold-Heading Wire.

A leading manufacturer of casters, The Bassick Company also makes chair controls, automotive hardware, and other products. We have been supplying them with cold-heading wire for years. Production men at Bassick speak highly of the care Bethlehem exercises in making wire to meet their various requirements.

Steel wire for cold-heading is a Bethlehem specialty. Cold-heading wire has to withstand a lot of punishment — upsetting, extrusion, slotting, punching, pointing, and other operations. And when heat-treating follows cold-heading, the steel must respond properly to carburizing and other hardening treatments. Uniform gage and composition of the steel are of the highest importance always.

There are many other points which we watch carefully. Proper internal soundness and freedom from injurious surface imperfections are of special importance, because heading operations may cause even minor flaws to open up into wide cracks.

One of our technical men will be glad to discuss steel wire with you — whether you are planning to use wire for cold-heading or for some other application. Bethlehem makes nearly all kinds of steel wire. Let our nearest sales office give you full details.

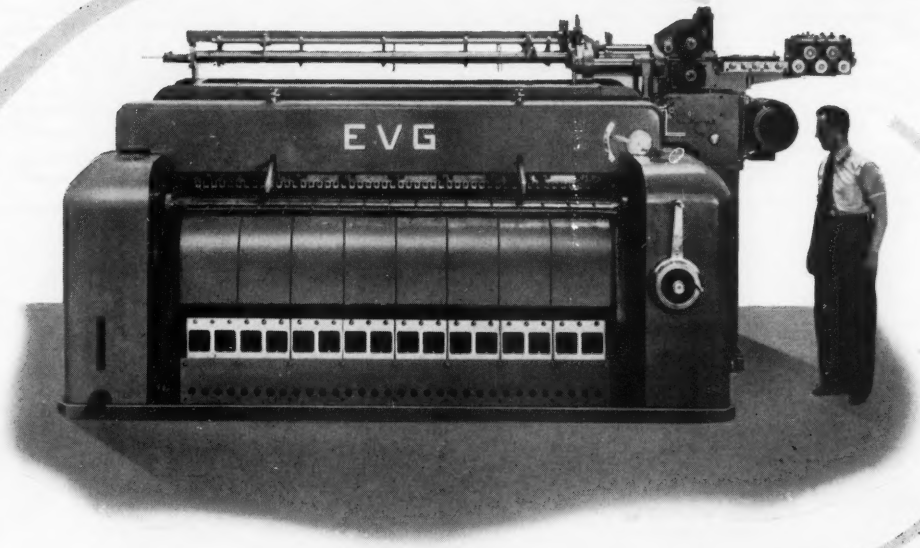
BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

LUNDY STEEL PRODUCTS CHOSE

for their new plant at Dunnville, Ontario



E.V.G.

Maschinen & Stahl A.G. of Switzerland/Austria, offer these **four** specialized welding plants, covering the whole field of welded wire fabric—

The HEAVYDUTY (Type G6)—Designed to produce the heaviest meshes (pipe fabric, etc.) wire sizes up to 7/0.

The UNIVERSAL (Type G5) As shown above—For all standard constructions of road slab reinforcing, building mesh, etc.—wire sizes from 3/0 to 11 gauge.

The PRECISION—For fencing and all types of visual mesh. Accurate welding in the lightwire range (gauges 11-15).

The Hi-SPEED—Operating in the fine wire range (gauges 16-22). Mesh spacings as small as ½" x ½".

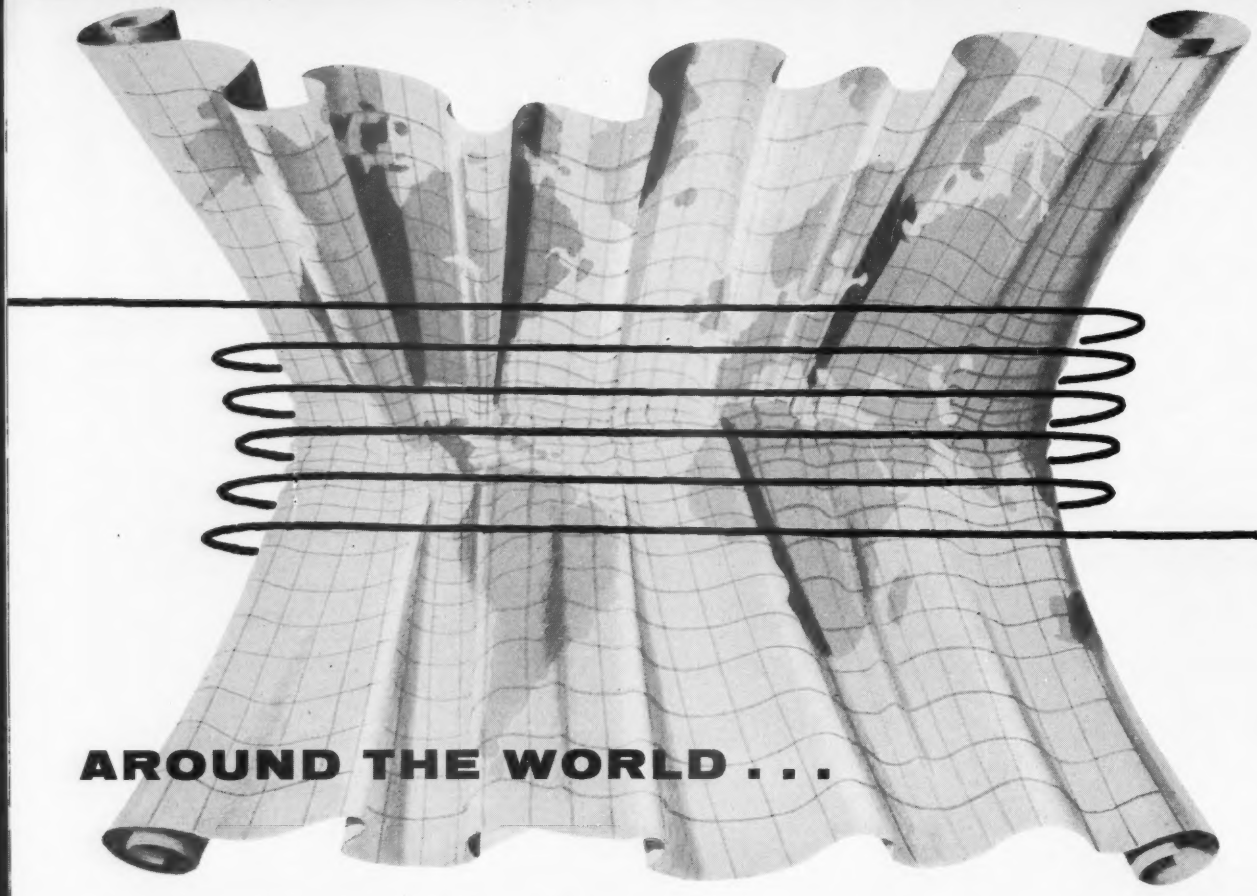
Specifications and performance data upon request.

Please direct inquiries to

RICHARD E. KLEINHANS

Authorized Representative in the United States

122 East 42nd Street, New York 17, N. Y. • OXford 7-0770 — 7-0771



AROUND THE WORLD . . .

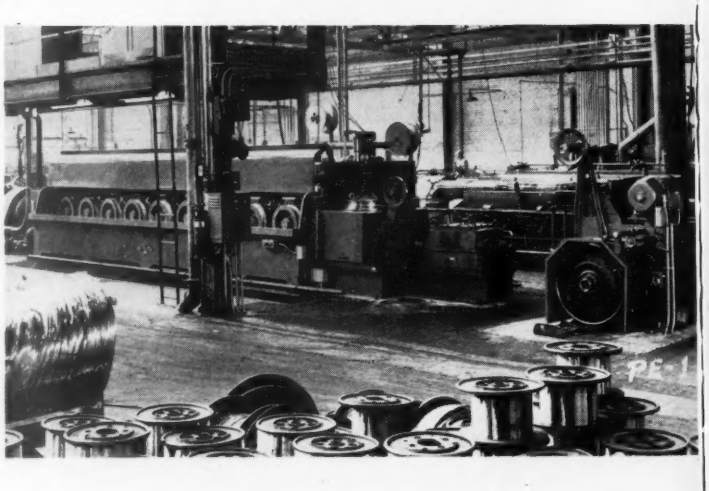
in 0.13388 seconds

Every day, wire takes another notch in the world's belt, translating distances from miles into seconds, using ever-increasing miles of wire.

SYNCRO machines are relied upon everywhere in helping to meet this seemingly limitless demand. SYNCRO designs and manufactures, with unsurpassed engineering skill, what every wire and cable mill requires: the very best wire drawing and associated machinery. A large portion of the world's wire is "drawn by SYNCRO".

A SYNCRO specialty is meeting design and production challenges — challenges posed almost every day by customers who must solve specific problems. The profit-making performances by SYNCRO machines everywhere are proofs of SYNCRO's ability to keep on top of these challenges — to come up with the most satisfying solutions.

When you need to know — call SYNCRO.



SYNCRO®

SYNCRO MACHINE COMPANY

Perth Amboy, New Jersey, U.S.A.

affiliated company: WINGET SYNCRO Ltd. Rochester Kent, England

Better Machinery for the Wire Industry

WIRE DRAWING MACHINES • DIE STRINGERS • CONTINUOUS ELECTRIC ANNEALERS • PAYOFFS • CAPSTANS • WIRE INSULATORS • HEAVY DUTY TAKEUPS • TAPERS • SPECIAL MACHINERY

WIRE AND WIRE PRODUCTS*

Reg. U. S. Pat. Off.

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 31 December, 1956 No. 12

Designated as Official Publication By The Wire Association

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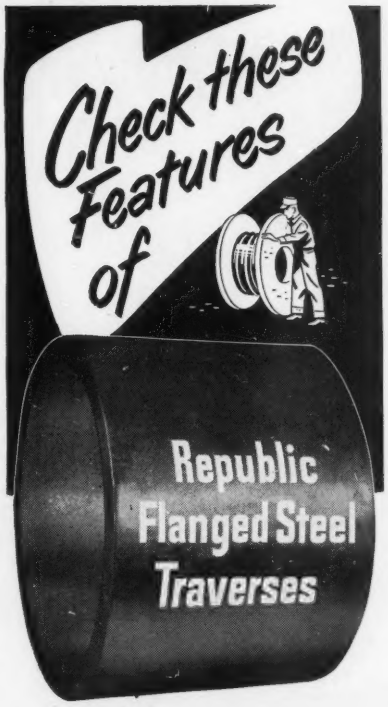


1. Light Weight

2. High Strength

3. Top Durability

4. Easy to Assemble

5. Smooth Galvanized Surface—no rough spots to damage plastic-covered cable

● Made in sizes up to 56-inch diameter and 48-inch traverse—in plain, painted or hot dip galvanized finish—as light as 18-gauge steel. Width of flange and number of bolt and drain holes furnished to your specifications. Available for prompt delivery. Write for prices.

REPUBLIC STEEL CORPORATION
Pressed Steel Division
6102 Truscon Avenue, Cleveland 27, Ohio

☐ Please send more information on Republic Flanged Steel Traverses.

Name_____ Title_____

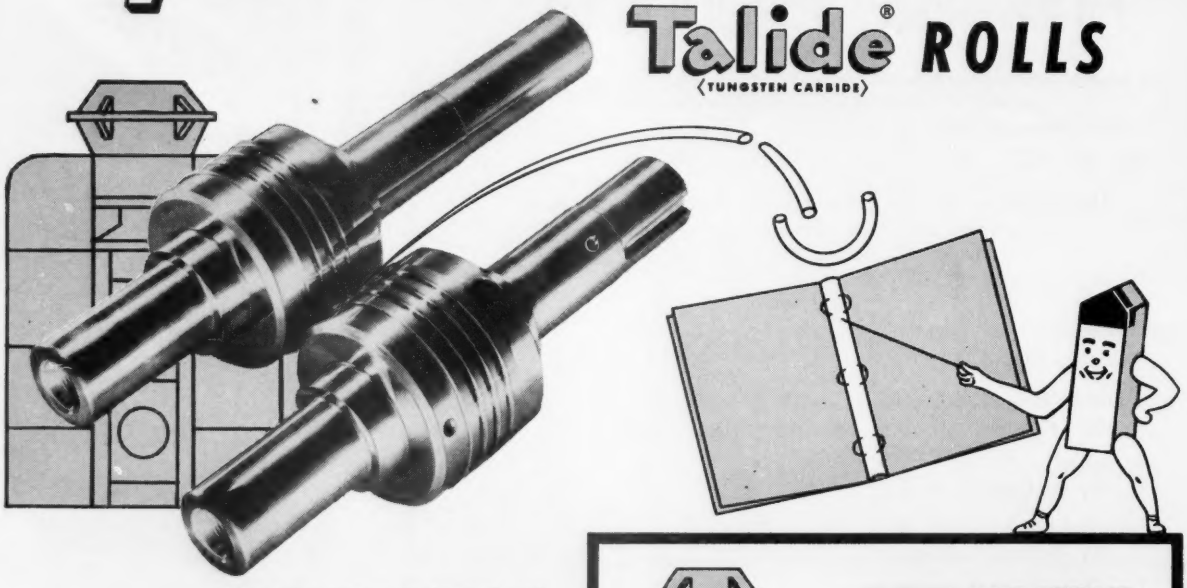
Company_____

Address_____

City_____ Zone____ State_____

C-1622

7 years' continuous service with Talide® ROLLS
(TUNGSTEN CARBIDE)



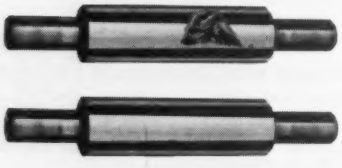
● A large Eastern Producer of oval-shape wire for loose-leaf notebook rings was experiencing excessive wear and pick-up. The high scrap rate was making the item unprofitable. Metal Carbides service engineers were called in to determine if Talide rolls could correct the trouble. Hi-carbon wire was being reduced on a 2-hi cold rolling mill to an oval shape .100" thick x .156" wide. Considerable stress and pressure was required to deform the wire to proper shape.

Our engineers designed a roll incorporating a carbide sleeve having 3 grooves ground in periphery and mounted to a special alloy steel arbor. The initial pair of rolls was installed in 1948 and has been in continuous service ever since. Due to their extreme hardness it has not been necessary to remove them from the mill during this 7-year period—not even for a regrind! Size and shape of wire has been perfectly maintained. Customer has since installed similar rolls on all their mills.

SUPERSET GRINDING WHEEL

The Superset diamond grinding wheel was specially developed for grinding carbide rolls to highest possible surface finish and luster. Made of 4-8 micron size diamond dust, it imparts a surface finish far superior to any other commercial wheel. Available in sizes up to 25" diameter.

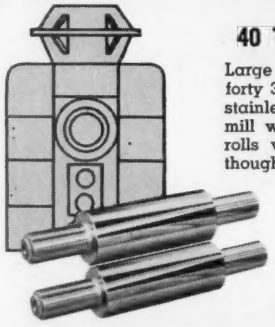
EXCLUSIVE REPAIR SERVICE



Broken or damaged carbide rolls can be re-worked to first class condition with all defects eliminated at one-half original cost. Only Metal Carbides offers this service—because of its exclusive hot press method.

Metal Carbides Corporation,
Youngstown 12, Ohio.

Send for new 84-page catalog 56-G

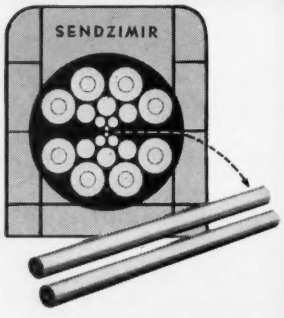


40 TIMES MORE TONNAGE

Large Steel Producer cold rolls forty 3,000 lb. coils (60 tons) of 18-8 stainless steel, series 300, on 4-hi mill with one pair of solid Talide rolls with no surface wear, even though strip work hardens to 50 Rockwell "C" in one pass. Flatter, smoother strip produced—even when rolling intermittent widths. 40 pairs of steel rolls were required previously to produce same tonnage.

ROLL LIFE INCREASED 278 to 1!

All users of Sendzimir rolling mills have adopted Talide work rolls because operating results have been phenomenal, far surpassing all expectations. Tremendous production runs are commonplace with mill after mill reporting increased tonnage runs between roll changes of 278-1, 179-1, 82-1, etc.



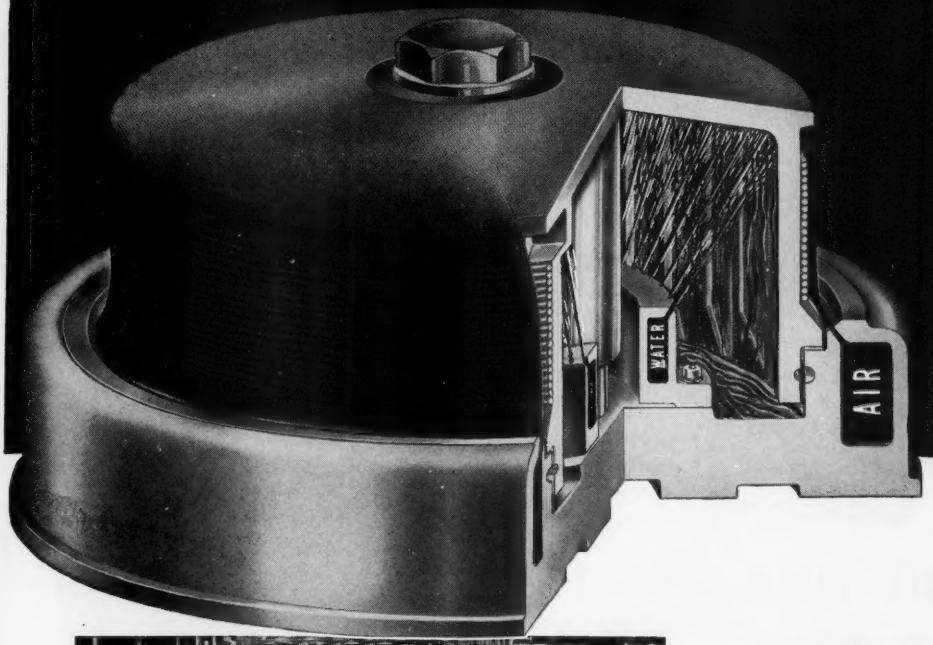
Talide Rolls are made in lengths up to 100", diameters up to 25", and up to 5000 pounds by weight.

METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 12, OHIO

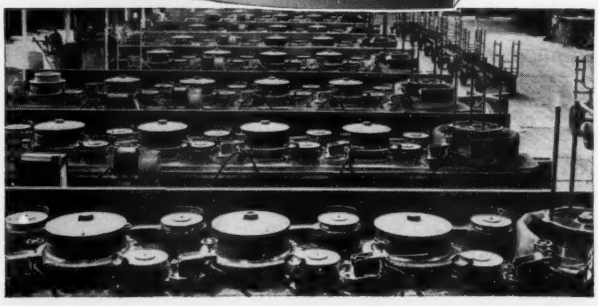
HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • CERMETS • HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

Vaughn® MOTOBLOC® MOTOBLOX®

with AIR and WATER



for perfect wire condition from start to finish!



Vaughn DOUBLE-COOLED blocks insure desirable temperatures for high carbon wire all the way through the draw—thanks to advanced engineering that provides *both* air and water cooling. Each block is equipped with an annular air blast for external cooling of the wire, while water jets impinging on the inner finned block walls remove heat continuously and effectively.

• *Let us discuss the benefits to your wire on your operation!*

The Vaughn Machinery Co., Cuyahoga Falls, Ohio, U. S. A.

"Quick on the Draw!"

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

Unretouched photograph of *Carboloy R-8 Wire Die*, used for drawing low-carbon steel at the Wyckoff Steel Company, New England Works. After producing 5,014,000 lbs. of wire in 14 years, the inside diameter has increased only .0037". (R-8 die shown 1⅓ times actual size.)

MORE THAN 5,000,000 LBS.
OF WIRE DRAWN DURING . . .

14 YEARS ON THE JOB . . . AND THIS CARBOLOY DIE HAS CHANGED ONLY .0037"

This Carboloy* R-8 die has drawn more than 2000 miles of wire since put in operation in 1942. Yet its inside diameter has changed only .0037" since it was purchased. What's more, the approach has never needed polishing; the wear ring has never needed removing.

This case history is one of the most spectacular in the history of carbide wire dies. But it is a typical example of the extra-long service life you can expect from every Carboloy die.

Equally important, you can depend on savings in grinding and downtime costs . . . longer production runs; smoother, more accurate wire.

Add in the other Carboloy "bonuses" for wire die users: immediate local delivery, on-the-job engineering service, wire-die training school for your personnel, and die servicing and finishing facilities. You'll see why more and more mills specify Carboloy carbide dies.

For engineering service, or your copy of the Carboloy Die Catalog and Service Manual, write: *Metallurgical Products Department of General Electric Company, 11171 E. 8 Mile Street, Detroit 32, Michigan.*

CARBOLOY

CEMENTED CARBIDES

*Carboloy is a trademark of General Electric Company

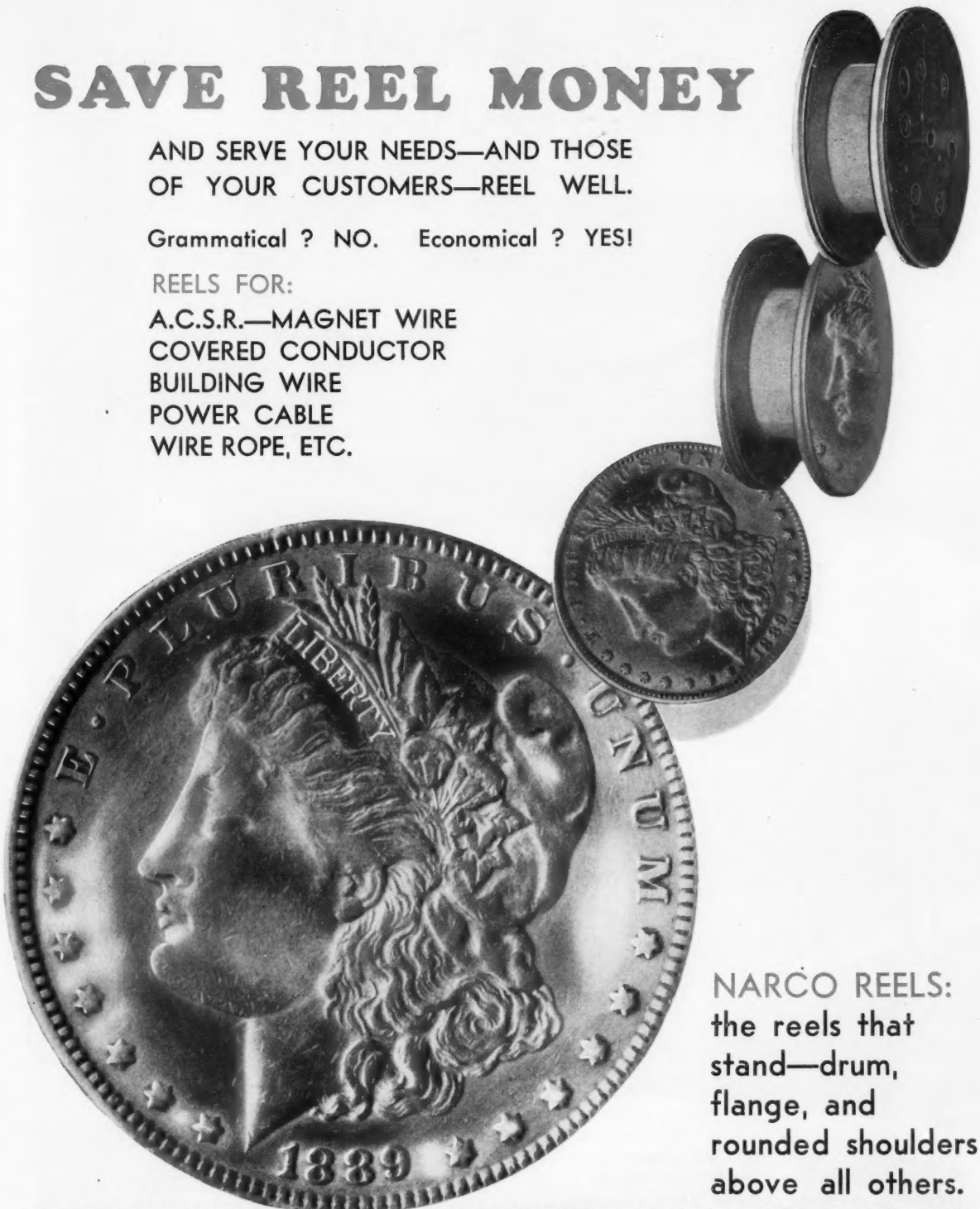
SAVE REEL MONEY

AND SERVE YOUR NEEDS—AND THOSE
OF YOUR CUSTOMERS—REEL WELL.

Grammatical ? NO. Economical ? YES!

REELS FOR:

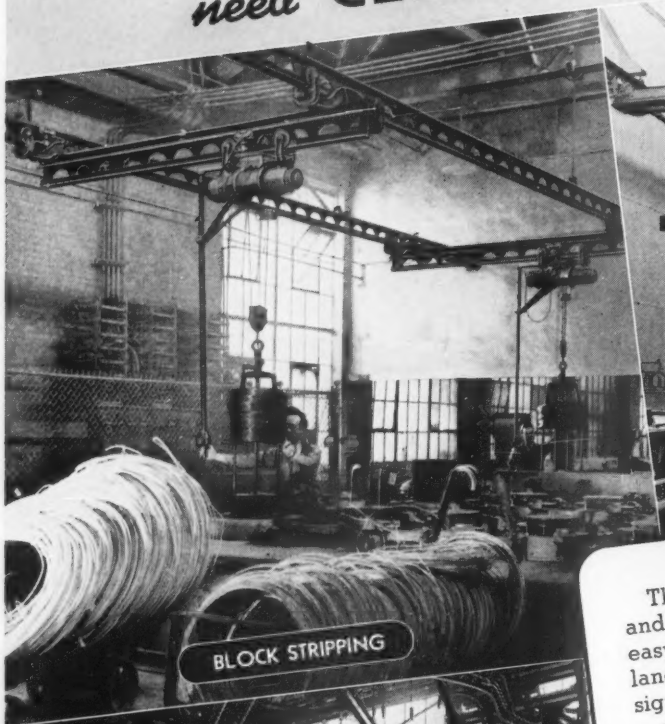
A.C.S.R.—MAGNET WIRE
COVERED CONDUCTOR
BUILDING WIRE
POWER CABLE
WIRE ROPE, ETC.

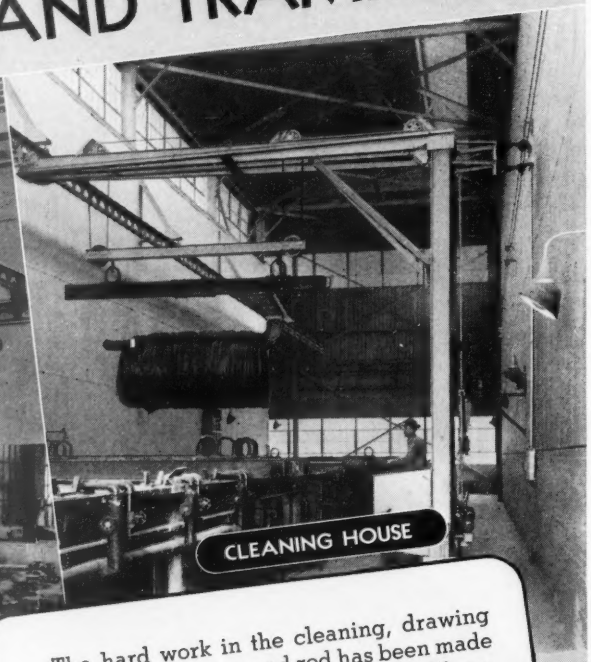


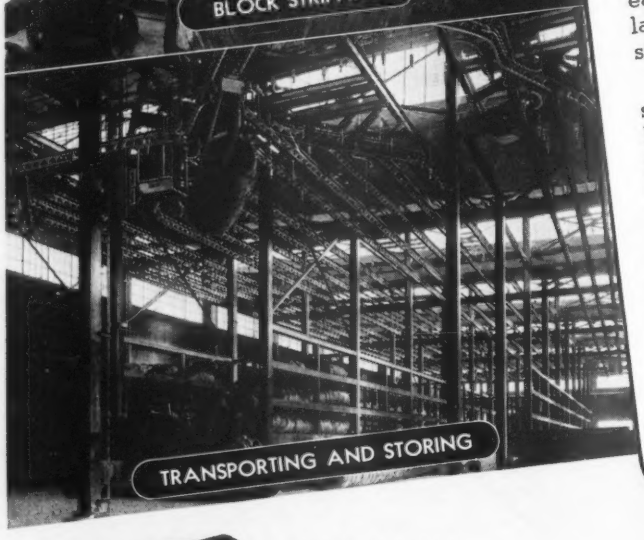
NARCO REELS:
the reels that
stand—drum,
flange, and
rounded shoulders
above all others.

• • • • MAKERS OF REELS SINCE 1909 • • • •

ROD AND WIRE PLANTS *need* CLEVELAND TRAMRAIL







The hard work in the cleaning, drawing and handling of wire and rod has been made easy, fast and safe by application of Cleveland Tramrail equipment especially designed for the work.

Perhaps no other single factor has been so influential in increasing production and lowering costs in the wire or rod mill as properly designed and applied overhead materials handling equipment.

Today more producers and fabricators of wire and rod are enjoying the many advantages of Cleveland Tramrail than ever before and the list of prominent names in this industry is growing rapidly.

It costs you nothing to learn what Cleveland Tramrail can do for you, but it may be of tremendous importance in the immediate years ahead. Why not investigate now?

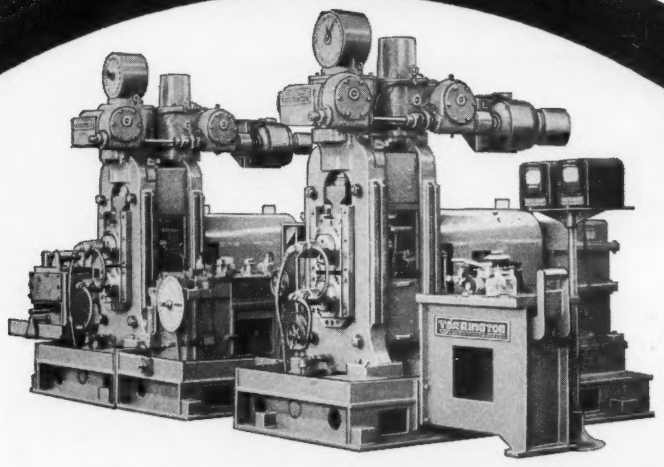
GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
9209 EAST 288th STREET, WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

YOU CAN LOWER WIRE ROLLING COSTS



...with a Torrington Flat Wire Mill

SPEEDED PRODUCTION — Torrington Flat Wire Mills achieve finishing speeds up to 3500 FPM.

GREATER ACCURACY — Processed wire can be held to tolerances of .00025″ in thickness and .0005″ in width. Automatic magnetic gauges eliminate waste.

FLEXIBILITY — Combination of two or three flattening stands, with edgers, can accommodate wide variety of work.

DEPENDABILITY — Torrington machines are ruggedly built for years of repair-free service. Easy access to flattening rolls and other major components greatly reduces downtime for maintenance, adjustment and threading.

COMPLETE ENGINEERING SERVICE — Auxiliary mill machinery should be selected only after thorough consultation with experienced engineers. Torrington's engineering staff, backed by the knowledge and skill gained while serving the metal mills for nearly 70 years, will work with you to provide machinery best fitted to your needs. For full information, call or write: Mill Machinery Division, Torrington Manufacturing Company, Torrington, Conn.

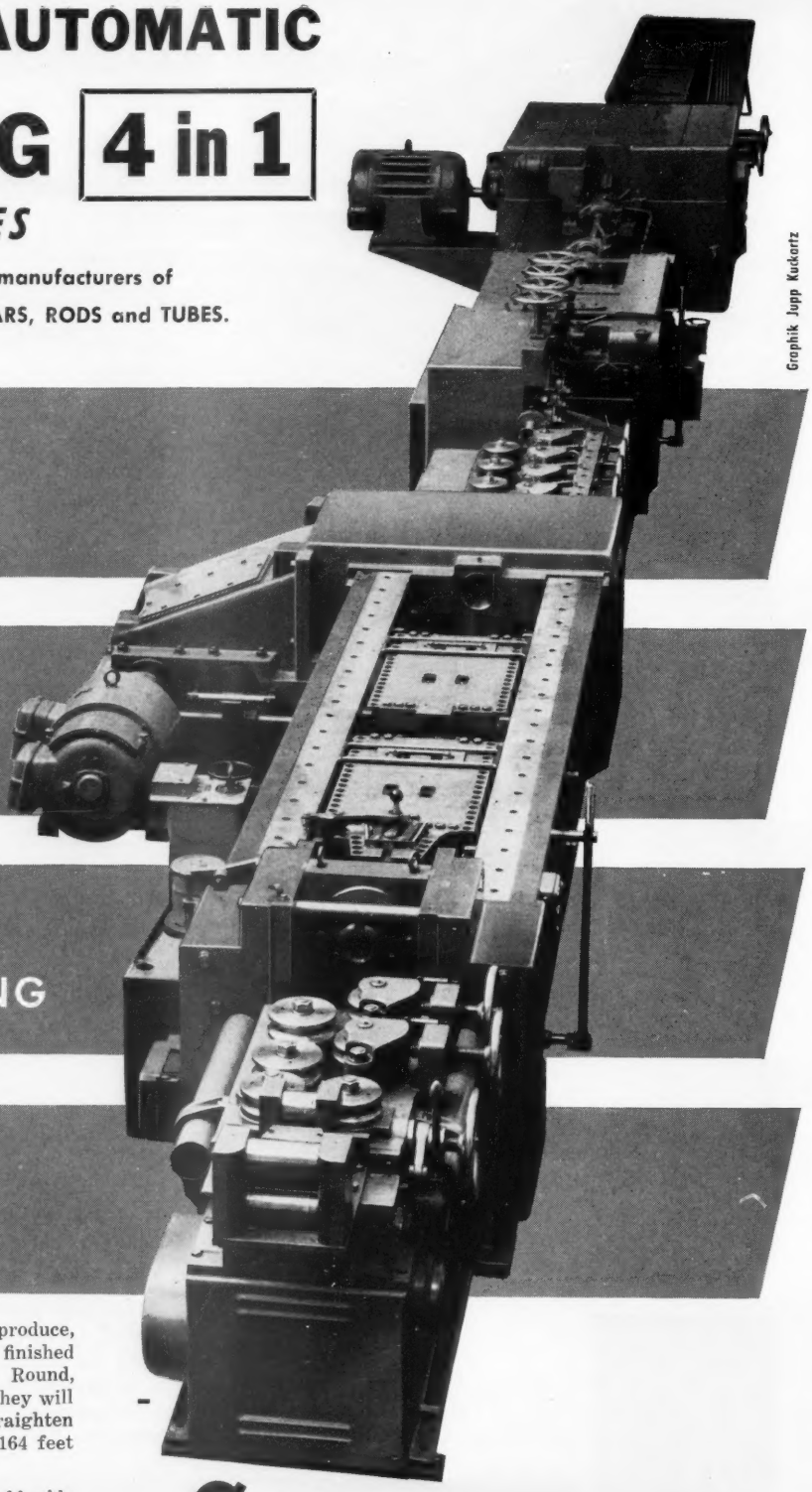
THE
TORRINGTON
MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT
VAN NUYS, CALIFORNIA · OAKVILLE, ONTARIO

THE FULLY AUTOMATIC

SCHUMAG 4 in 1

ASSURES

Greatest efficiency for manufacturers of
Ferrous and Non-Ferrous BARS, RODS and TUBES.



Graphik Jupp Kuckartz

4
POLISHING

3
CUTTING

2
STRAIGHTENING

1
DRAWING

- SCHUMAG "4 in 1" machines produce, **in one continuous operation,** finished Bars, Rods and Tubes from Round, Square or Hexagon material. They will Finish draw, Cut-to length, Straighten and Polish at speeds from 92-164 feet per minute.
- SCHUMAG "4 in 1" enjoys world-wide reputation as the **ultimate** in technical development.

SCHUMAG
AACHEN

Exclusive Representatives for USA, Canada & Mexico
AMERICAN LAUBSCHER CORPORATION Fisk Bldg., 250 West 57th Street, New York 19, N. Y.

A REPORT FROM KELLOGG ON

KEL-F® GRADE Plastic 500

Results of electrical tests on Grade 500	
VOLTAGE BREAKDOWN	**VOLTS**
Initial volts	13,500
at 150°C.—1 week	13,000
2 weeks	14,600
at 175°C.—1 week	13,500
2 weeks	14,500
at 190°C.—1 week	11,300
2 weeks	9,600

New Fluorocarbon Plastic Formulation Provides Wire Insulation that can withstand Continuous Operating Temperature up to 175° C.

KEL-F PLASTIC, Grade 500—like all the molding compounds in the KEL-F fluorocarbon series—is notable for its extreme resistance to high temperatures, chemical attack, humidity and abrasion.

Of special interest to the electrical field is the higher heat-aging level of wire coatings with the new Grade 500. Tests on wire insulation indicate a continuous operating range of temperatures up to 175°C. Samples of coated wire exposed to temperatures as high as 190°C. for extended periods of time (2-3 months) still maintain relatively high voltage breakdown values.

Results of these electrical performance tests are summarized in the table above. An examination of the breakdown voltages after continuous exposure to high temperatures points up the high heat-aging level reached by KEL-F PLASTIC Grade 500 coated wire.

TWO TYPES AVAILABLE

KEL-F PLASTIC GRADE 500 is produced in two distinct types:

GRADE 500-F, a less crystalline type that resists embrittlement by high temperatures. Recommended for general wire and cable insulation, hook-up wire, thin wall tubing, and spaghetti.

GRADE 500-R, possesses same general properties as F type, only a slightly more rigid formulation. Recommended for use in connector insulation and for coil forms.

MOLDABILITY

The new Grade 500 permits extrusion of high molecular weight coatings and thin wall tubing that resist embrittlement when exposed to higher temperatures. Less crystalline in structure, Grade 500 can be fabricated without danger of splitting or crazing when heated. The flexibility of Grade 500 coated wire is also slightly improved.

TECHNICAL SERVICE

KEL-F PLASTIC Grade 500 is a result of Kellogg's comprehensive research in the field of fluorocarbon chemistry. Our technical staff will be happy to work with you in developing specific applications for the new Grade 500.

REPORT ON KEL-F PLASTIC, GRADE 500

Kellogg's TECHNICAL CUSTOMER Service Staff has prepared a technical report on KEL-F PLASTIC, Grade 500. It contains information on properties, extrusion techniques and operating conditions, electrical tests, and field evaluation of the new 500 Grade. To get your copy, just clip and mail coupon below.

® KEL-F is a registered trademark of The M. W. Kellogg Co. for its fluorocarbon products.

THE M. W. KELLOGG COMPANY
Subsidiary of Pullman Incorporated
Chemical Manufacturing Division
P. O. Box 469, Jersey City, N. J.

Please send me a copy of your First Report on KEL-F PLASTIC—Grade 500.

Name_____

Firm_____ Position_____

Address_____

City_____ Zone_____ State_____

SCOVILL WIRE

COPPER-BASE ALLOY

available in . . .

payoffpak

Here is one of the most important and practical "differences" Scovill has made available to wire formers. PAYOFFPAK is the NEW optional (without extra cost) method for packaging Scovill Copper-base alloy Wire, resulting in immediate time and cost-saving advantages to you. Check these advantages listed below . . . then get in touch with us at Waterbury, or at your nearest Scovill sales office listed below.

WIRE IS FED DIRECTLY FROM DRAWING MACHINE INTO PAYOFFPAK.

SHIPPED TO CUSTOMERS FULLY PROTECTED, CLEARLY LABELED . . . EASY TO INVENTORY.

SCOVILL'S WIRE PAY-OFF FEEDER ELIMINATES REELS OR SPOOLS.

LONG CONTINUOUS RUNS from UP TO 500 lbs. of wire in a single strand . . . with assured smooth-running pay-off, from the first foot to the last.

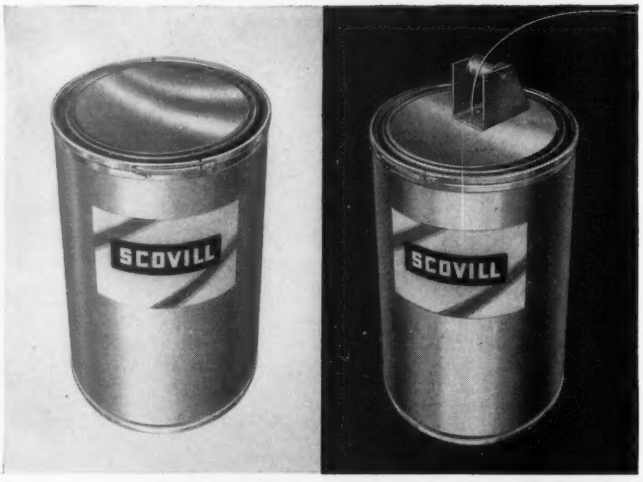
READY-TO-FEED pay-off to wire forming machines **eliminates** reels or spools.

LESS DOWN-TIME between runs . . . no small coils to change constantly.

MUCH EASIER HANDLING and storage . . . PAYOFFPAKS can be stacked.

PROTECTION to wire in shipment and storage.

NO EXTRA COST. Any Scovill Copper-base alloy Wire may be ordered delivered in the PAYOFFPAK in the following sizes and tempers: Diameters .016″ to .060″ inclusive any temper except SOFT. Diameters over .060″ to .212″ inclusive SOFT temper to 2 Nos. HARD.



SCOVILL MANUFACTURING COMPANY, WATERBURY 20, CONNECTICUT

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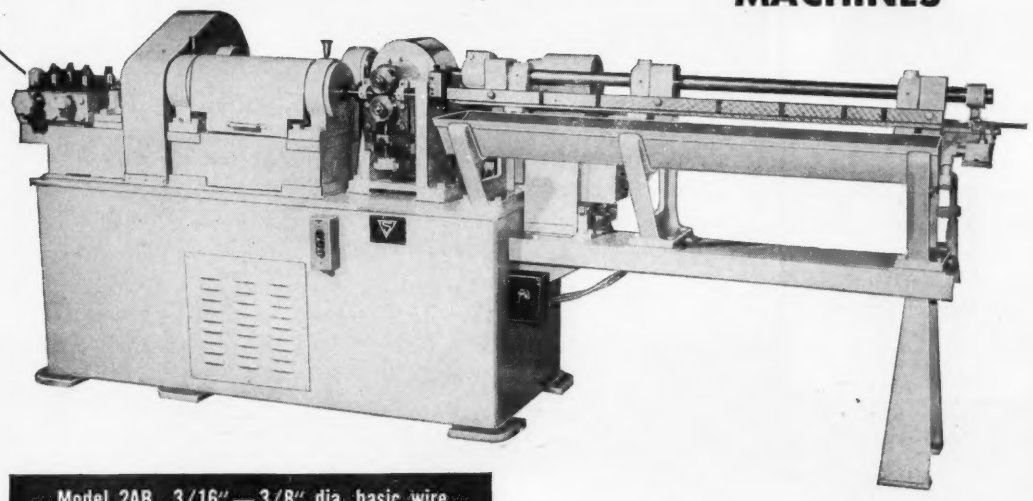
LOS ANGELES 22, CALIFORNIA: 6464 EAST FLOTILLA STREET

13SC56R

SHUSTER

WIRE STRAIGHTENING AND CUTTING MACHINES



Model 2AB 3/16" — 3/8" dia. basic wire

Now — All Electric!

Electrical control of Target and Clutch now standard equipment on all models!

Electronic cut-off on both constant and variable speed Shuster machines produces accurate, square, clean-cut lengths of wire! Operator simply locks the stop rod gauge for desired length of cut. Target operated by sensitive microswitch. Electric brakes standard equipment on large models.

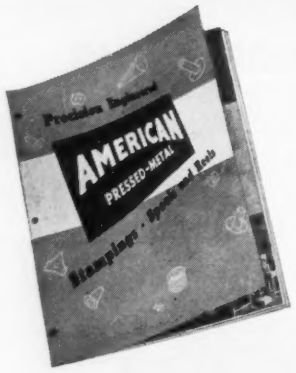
- Cut square, true, undistorted ends
- A model for any job from .025 to 11/16" diameter
- Simple, economical operation
- Trouble-free maintenance
- Variable or constant speed machines
- Over 30 models to fit your needs
- Flat and square stock machines available

Also available: Tube straighteners, feed starters, reels, roll straighteners, short-cut machines.

Write for literature!

Constant speed
SHUSTERS
from .025 to 1/2" dia basic wire

Variable speed
SHUSTERS
from 1/16" to 11/16" dia basic wire



Send for your free copy of our latest bulletin on American Pressed-Metal Spools and Reels. It contains full details and charts on the many standard types.

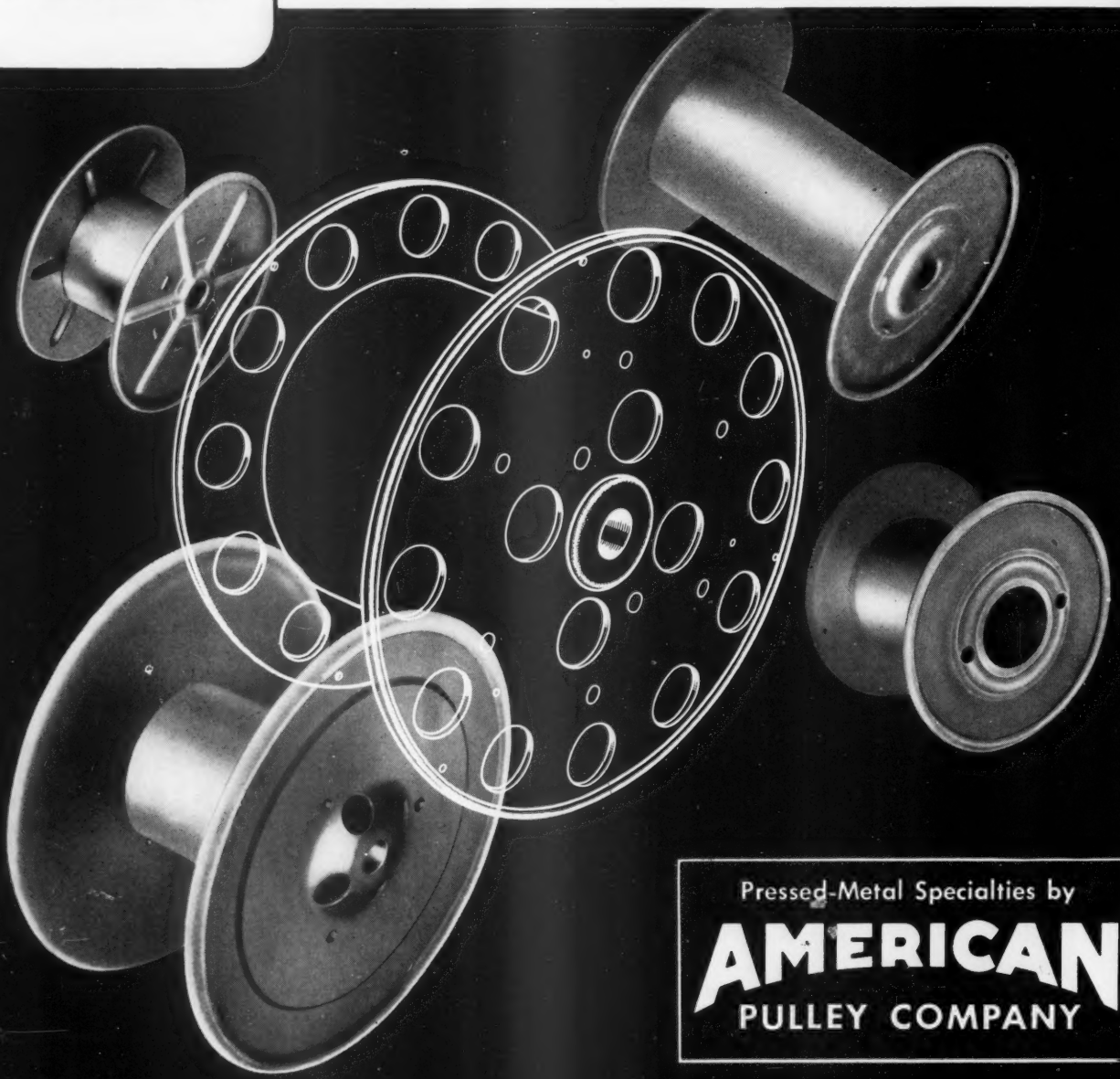
For shipping or processing spools and reels get exactly what you want from American Pulley

Name your need . . . there's an American pressed-metal reel or spool to meet it. And if our long list of standard sizes doesn't contain the model you need, we'll custom-build one to your exact requirements.

American pressed-metal spools and reels are practically indestructible—won't crack, chip or warp. They offer the added advantages of light weight, cleanliness and strength.

Almost 60 years' experience in design and manufacture—plus a vast assortment of tools, dies and other facilities for making all types of spools and reels to strict custom specifications—are at your service.

Send us your specifications, blueprints or merely tell us what you need and we'll design from scratch. You'll find our quotations fast, realistic and offering you good value for the money. The American Pulley Company, 4242 Wissahickon Ave., Philadelphia 29, Pa.



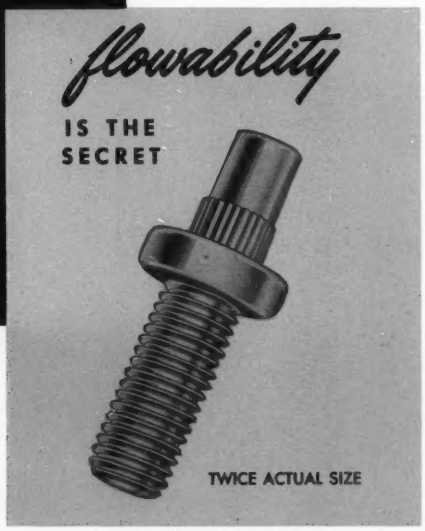
Pressed-Metal Specialties by

AMERICAN

PULLEY COMPANY

KEYSTONE XL WIRE STUDY

SCREW CENTRAL COMPANY



Tough cold heading jobs...

longer runs... lower costs

CENTRAL SCREW CO. of Chicago, Illinois, tackles many intricate cold heading jobs. A few are illustrated. All are processed from Keystone "XL" Wire. The auto horn mounting stud, shown in the color panel, was a tough forming job, upset in two blows. After trying other wires, Central Screw Co. changed to Keystone "XL" Wire and successfully produced this part with much longer runs due to increased die life. Rejections were cut to a minimum. The result—a quality finished product at a lower cost.

Time and again, quality Keystone "XL" Cold Heading Wire has made it possible to perfectly form the most intricate fasteners or parts. A Keystone Wire Specialist will gladly discuss your problems and make recommendations. Your inquiry is invited.

Keystone Steel & Wire Company, Peoria 7, Illinois

KEYSTONE

WIRE FOR INDUSTRY

KEYSTONE STEEL & WIRE COMPANY
Peoria 7, Illinois

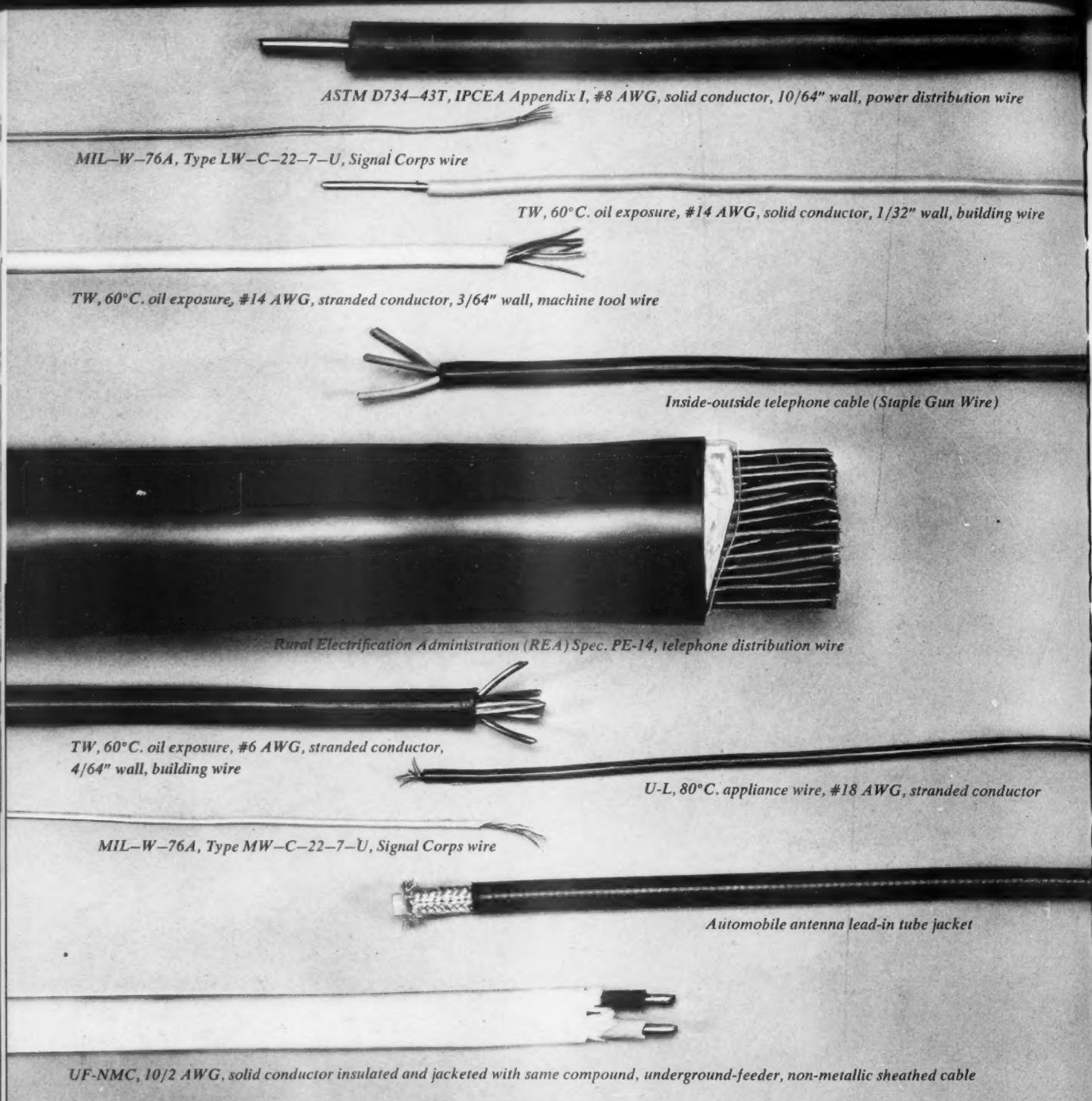
Mail coupon for free booklet—
COLD HEADING FACTS! Discusses methods, technical facts, wire requirements and other data.

Name_____ Title_____

Company_____

Street_____

City_____ State_____



ASTM D734–43T, IPCEA Appendix I, #8 AWG, solid conductor, 10/64" wall, power distribution wire

MIL–W–76A, Type LW–C–22–7–U, Signal Corps wire

TW, 60°C. oil exposure, #14 AWG, solid conductor, 1/32" wall, building wire

TW, 60°C. oil exposure, #14 AWG, stranded conductor, 3/64" wall, machine tool wire

Inside-outside telephone cable (Staple Gun Wire)

Rural Electrification Administration (REA) Spec. PE-14, telephone distribution wire

TW, 60°C. oil exposure, #6 AWG, stranded conductor, 4/64" wall, building wire

U-L, 80°C. appliance wire, #18 AWG, stranded conductor

MIL–W–76A, Type MW–C–22–7–U, Signal Corps wire

Automobile antenna lead-in tube jacket

UF-NMC, 10/2 AWG, solid conductor insulated and jacketed with same compound, underground-feeder, non-metallic sheathed cable

One vinyl compound for all–versatile OPALON* 1038

Remarkable physical and electrical properties qualify OPALON 1038 for scores of uses

A single insulating and jacketing compound now gives outstanding performance on a wider range of wire and cable applications than has ever been practical before. It is available to you *without* a premium price!

A unique combination of high insulating efficiency, excellent heat resistance and extreme toughness is responsible for the all-purpose versatility of Monsanto Opalon 1038 vinyl compound.

Opalon 1038 is widely used for U-L Type T, TW and exposure to oil at 60° C., as well as for U-L 80° C. appliance wire.

To simplify inventory and stock control, the same compound is recommended for both primary insulation and jacket in UF-NMC, underground feeder and non-metallic sheathed cable. It is especially good for machine tool wiring.

Rugged physical properties, including weather resistance and flame resistance, also qualify Opalon 1038 for insulating large-sized building wire (#6 AWG and over) and for cable jacketing.

All these applications have won appropriate recognitions from U-L, IPCEA, REA and Government agencies. For data sheets and complete information, write Monsanto Chemical Company, Plastics Division, Room 1127, Springfield 2, Mass.

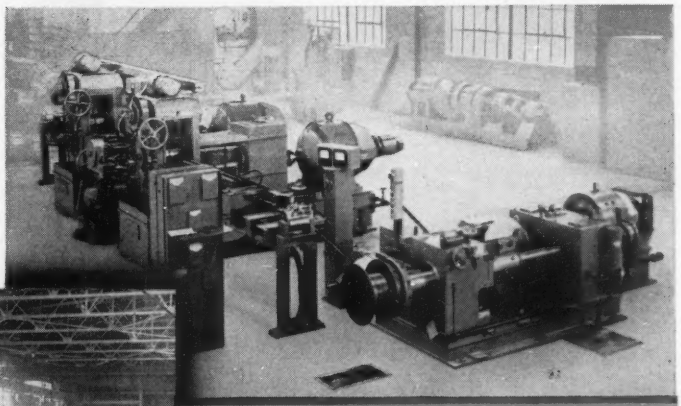
MONSANTO

*OPALON: REG. U. S. PAT. OFF.

Waterbury Farrel Wire Flattening MILLS IN ACTION

Pictured here are a few of the many Wire Flattening Mills designed and built by Waterbury Farrel. Each installation was custom-engineered to fit the production requirements of each individual customer.

Whether your requirements call for a single or multiple stand mill, Waterbury Farrel can supply you with a reliable production unit that will prove to be a profitable investment.

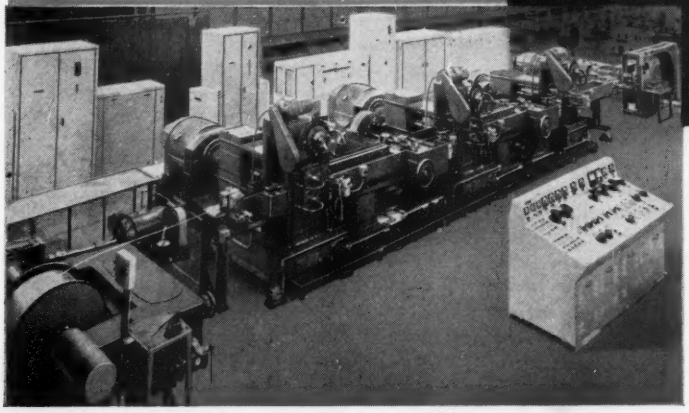


▲ Two Stand Tandem Wire Flattening Mill at National Electric Coil Co., Columbus, Ohio. Speeds up to 1000 feet per minute.

Two Stand Tandem Wire Flattening Mill recently installed at John A. Roebling's Sons Corp., Trenton, N. J. Speeds up to 1500 feet per minute.. ▼

▲ Three Stand Tandem Wire Flattening Mill in production for Anaconda American Brass Co. Ltd. (Subsidiary of the American Brass Co.) New Toronto, Ontario, Canada. Speeds up to 1800 feet per minute.

Three Stand Tandem Wire Flattening Mill installed at General Electric Co. in their Pittsfield Works. Speeds up to 2500 feet per minute.. ▼



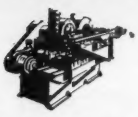
Write today for your free copy of Wire Flattening Mills, Cir. No. 731-R.

WATERBURY FARREL

THE WATERBURY FARREL FOUNDRY & MACHINE CO. Waterbury, Conn.

Sales Offices:
Chicago • Cleveland • Millburn, N. J.

WATERBURY FARREL FOUNDED 1851



Bolt, Nut & Screw Machinery • Power Presses • Rolling Mill Machinery • Wire Mill Equipment • Sendzimir Mills and other Special Machinery

WF-32

by **SYNTHETIC**

Synthetic yarns of Viscose Rayon, Acetate Rayon, High Tenacity Cordura, Nylon, Dacron, Orlon and Fortisan, together with Purified Cotton (manufactured under Western Electric License), furnished you on Single or Multiple Wound Braider or Serving Tubes, in Standard packages.

Special Twisting, featuring knotless packages, is also done. We can supply all yarns in constructions and in packages to meet your exact specifications.

Cotton yarns in all sizes.

DYED YARNS ARE OUR SPECIALTY

Synthetic and cotton yarns treated for electrical applications.

WAXED LACING CORDS CORE YARNS

In fact, any yarn requirement for electrical insulation is either carried in stock or can be processed for you in our up-to-the-minute manufacturing facilities.

Write today for information.

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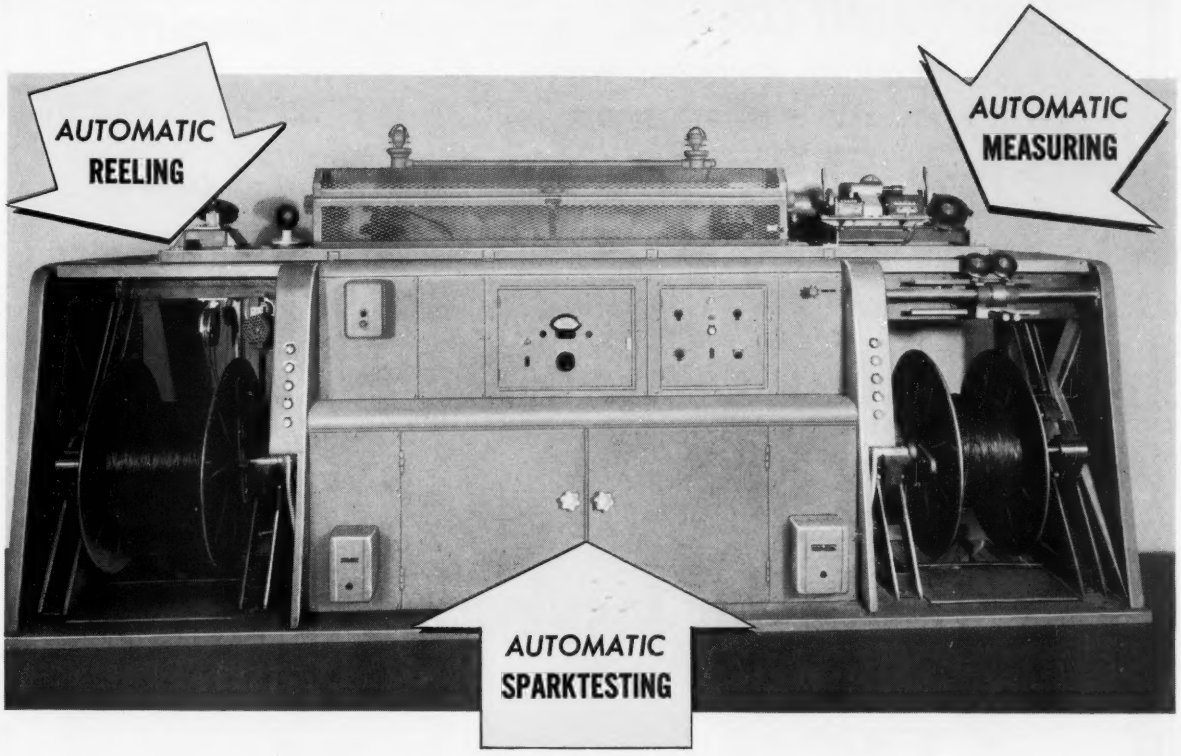
SAVE 14 FEET FLOOR SPACE



New Entwistle Retester Combines Six Wire Processing Machines In One Compact Unit

The new Entwistle Type A Retester saves 14 feet floor space by combining pay-off, tension control, sparker, electrode, measuring, and take-up devices in *one* compact unit. Reeling, measuring and spark testing is automatic. Pay-off and take-up reels are pneumatically raised and lowered. Space is provided within the unit to allow for the installation of a patching press, if desired. A constant and even wire tension is maintained by a dancer control.

The Entwistle Type A Retester stops automatically when a fault is detected. A mere flick of a finger throws the machine into reverse. When fault re-enters the electrode, the retester *again* stops automatically. This greatly facilitates patching, saves time and steps up efficiency of the entire operation. Regardless of the build-up of the reel, within the speed range of the reeler, the Type A Retester maintains a plus or minus 2 per cent constant wire speed.

Find out how the Entwistle Type A Retester can help you step up production, cut inspection time, and gain valuable floor space in your plant. Write today for details.

ENTWISTLE MANUFACTURING CORPORATION

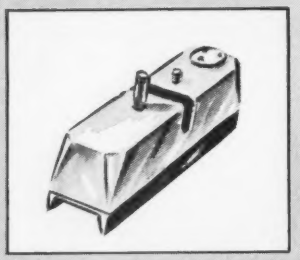
Plant and Executive Offices

1475 ELMWOOD AVE., PROVIDENCE 7, RHODE ISLAND

FORMERLY JAMES L. ENTWISTLE CO.

MODEL 309
MICROLIMIT CONTROL

FOR AUTOMATIC CONTROL OF INSULATED WIRE DIAMETER IN THE RANGE OF .025 TO .750 INCH



COMPLETELY ENGINEERED TO YOUR EXTRUDER

start savings in your insulating operations

- ***STARTING*** Save up to 50% of the compound and conductor usually lost in bringing the extruder up to speed — with *continuous gauging.*
- ***RUNNING*** Save several times the cost of the control annually by reducing nominal diameters — with *non-contact gauging.*
- ***LABOR*** Save manhours by relieving your operators for other essential work — with *automatic control.*

INDUSTRIAL GAUGES CORPORATION • WEST ENGLEWOOD, NEW JERSEY

"These *Payoffpaks* of CHASE® wire sure cut our wire forming costs!"

NOW you can form miles of wire with no costly down time

In this new PAYOFFPAK you get a continuous length of Chase copper alloy wire up to a total of 400 to 500 pounds in weight.

This extremely long wire length cuts to a minimum the amount of time lost in setting up a wire-forming machine, permits more continuous operation, reduces scrap loss. The Payoffpak is safe to use, easy to store ... cuts down on stock space.

In transit and storage, the Payoffpak protects the clean, smooth surface of Chase wire from rough and tumble handling. Your Chase wire comes out as bright and free of kinks as the day it was made.

Check with your Chase Wholesaler or nearest Chase Warehouse about getting your next shipment of wire in the new Payoffpak.

Chase®

BRASS & COPPER CO.

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

NEW! Chase's informative wire and rod movie: "IN THE CHIPS." Arrange for a free loan of this film by contacting the Chase warehouse or sales office near you. Write on your company letterhead, today!

The Nation's Headquarters for Brass, Copper & Stainless Steel

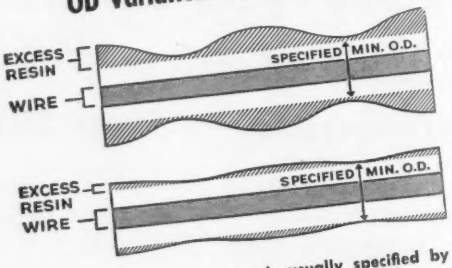
Atlanta, Baltimore, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Grand Rapids, Houston, Indianapolis, Kansas City, Mo., Los Angeles, Milwaukee, Minneapolis, Newark, New Orleans, New York, Philadelphia, Pittsburgh, Providence, Rochester, St. Louis, San Francisco, Seattle, Waterbury

U.S.I. POLYETHYLENE PROCESSING TIPS

Choose the Right Resin For Polyethylene Wire Coating

Now that polyethylene is being widely accepted as an insulating material for wire and cable, insulated wire manufacturers and plastics producers are working closely together to provide the best insulations at the lowest possible cost. Although the only true test of a given polyethylene resin is a test run followed by a thorough evaluation of the finished wire, there are certain principles that can be used beforehand as guides. For example:

OD Variations Cost Money



Minimum Outside Diameter is usually specified by the wire customer. But a variation in OD above this minimum uses extra quantities of polyethylene resin — and cuts into extruder profits. These variations can be reduced by using resins with consistant flow characteristics as shown in the lower sketch.

Higher Production Rate Means Higher Profit

The faster a machine can be operated, the more money it can make. But higher rates require tighter controls — especially tighter control of resin properties. A resin variation that might still give a satisfactory product at moderate production rates may not be acceptable when the extruding rate is pushed to its limit. Again, consistency of resin properties is of extreme importance.

Final Properties Are All-Important

Deformation under load, stress-cracking, low-temperature brittleness and spark failure must be kept to a minimum in an acceptable wire and cable insulation. Any resin used, no matter what its processing characteristics, must pass these tests.

Why We Recommend PETROTHENE®

Because we make it — of course. But more than that, PETROTHENE does a good job for wire and cable extruders because our manufacturing process does achieve the high consistency processors are looking for. Shipment-to-shipment, bag-to-bag, and cube-to-cube, variations are held to a minimum. This high consistency enables insulated wire manufacturers to operate at highest rates with minimum OD variation when using PETROTHENE electrical grade polyethylene resins.

PETROTHENE resin properties also measure up to end-use standards for deformation under load, stress-crack resistance, low-temperature brittleness and spark failure.

Three Basic Resins Are Available

PETROTHENE 300, M.I. = 0.3; PETROTHENE 301, M.I. = 1.0; PETROTHENE 302, M.I. = 2.8. Each available with carbon black, color, JZF antioxidant, and/or non-discoloring antioxidant, compounded to your specifications.

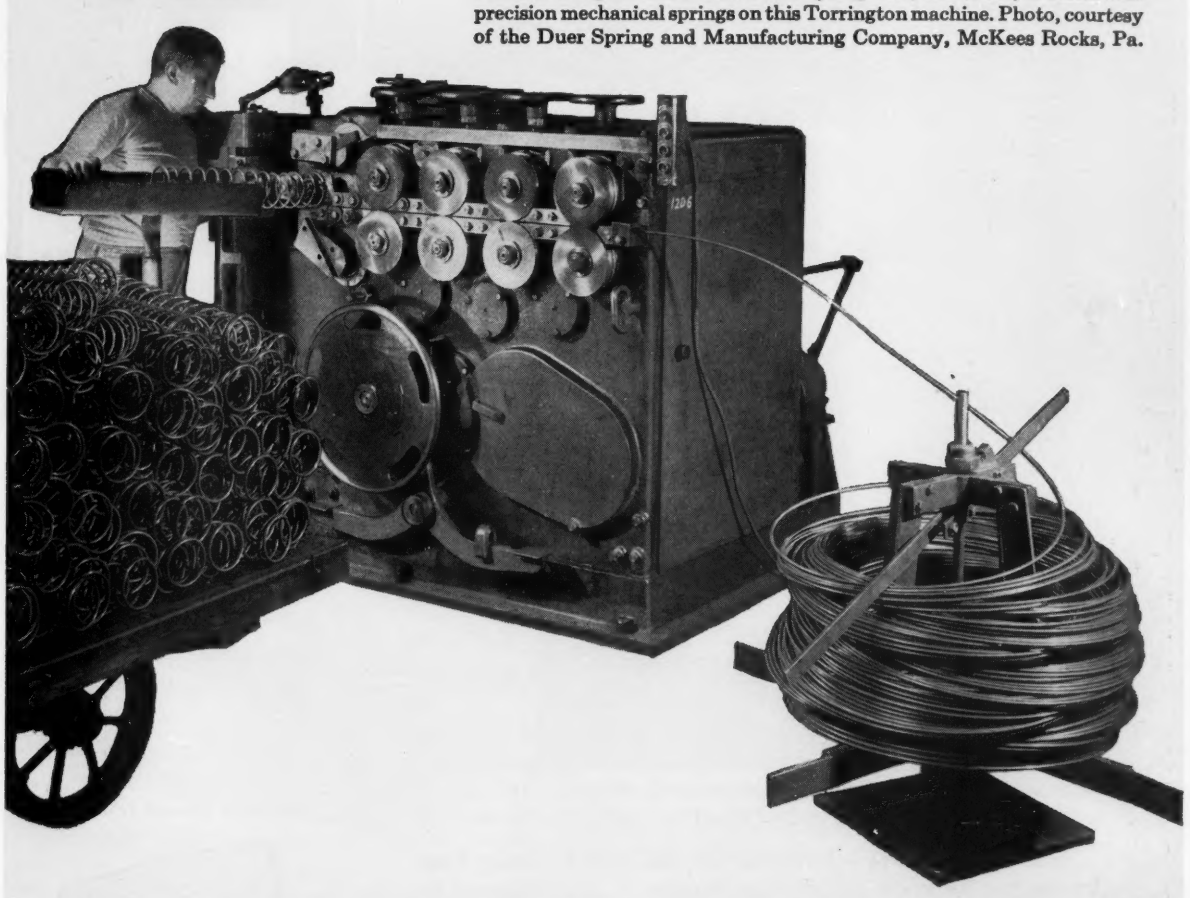
U.S.I. Services

Literature and samples of PETROTHENE electrical grade polyethylene resins are available at your request. U.S.I. Technical Service representatives are also ready to help you with individual processing problems.

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers Products Corporation
99 Park Avenue, New York 16, N. Y.
Branches in principal cities

J&L STEEL

Jones & Laughlin hard drawn MB spring wire, size .331", is coiled into precision mechanical springs on this Torrington machine. Photo, courtesy of the Duer Spring and Manufacturing Company, McKees Rocks, Pa.



SPECIFY J&L SPRING WIRE

. . . it's uniform, easy-to-work

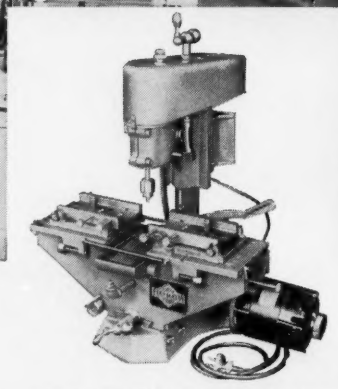
Outstanding Uniformity of J&L wire helps you produce better springs . . . with faster production, fewer rejects. J&L spring wire assures uniform physical and dimensional characteristics combined with specific finishes to meet your requirements.

Jones & Laughlin exercises rigid quality control in every operation from ore mine to finished product. Every coil of J&L spring wire, be it famous Mastercraft, hard drawn MB or Electromatic oil-tempered MB, is thoroughly tested. Jones & Laughlin spring wire is tops in quality . . . competitive in price.

Next time you order spring wire, call your J&L representative or write direct for prompt service.

Jones & Laughlin
STEEL CORPORATION · PITTSBURGH

This DIE room paid for itself!



Firth Sterling Nail Die Barbing Machine

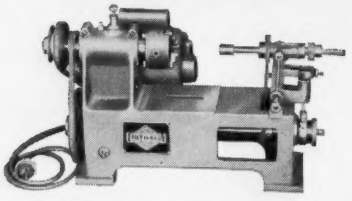
Firth Sterling can plan and equip one for you, too . . .

A well designed, well equipped and well organized die room soon pays for itself in savings resulting from longer die life, reduced downtime, smaller investment in die inventory and greater uniformity and quality of product resulting from precision tooling.

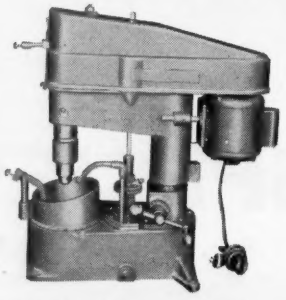
Firth Sterling, long a leader in the field with Firthaloy Dies, knows best die room practices as no other . . . and offers to the wire industry a complete die room planning and engineering service *right down to the machines to equip it.*

Firth Sterling tungsten carbide die finishing equipment is available from stock for complete tool room set-ups or as individual machines, according to your need.

Don't let an inadequate die room cost you money. Start the installation of a *modern* one by calling a Firth Sterling planning engineer. Do it now!



Firth Sterling Automatic Polisher



Firth Sterling Heavy Duty Ripper

R-315

Firth Sterling

—INC—

GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.

MILLS: McKEESPORT, TRAFFORD, DETROIT, HOUSTON, HARTFORD
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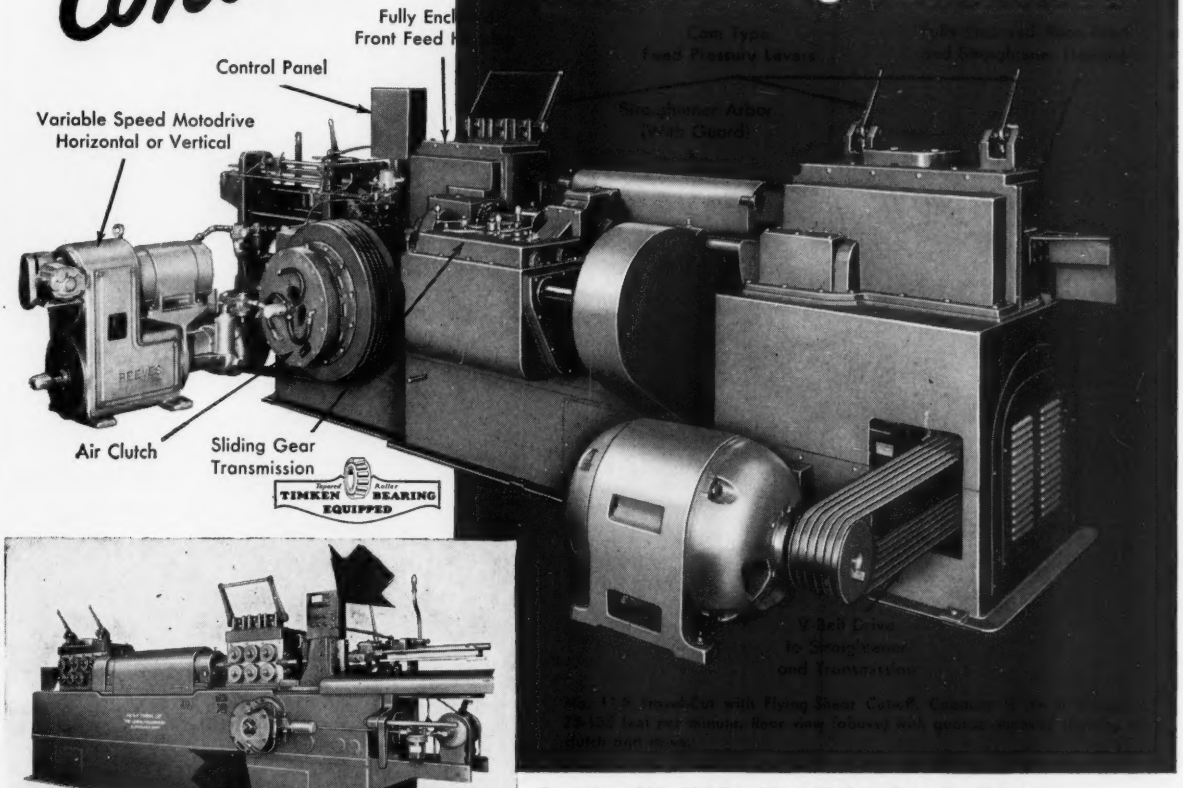
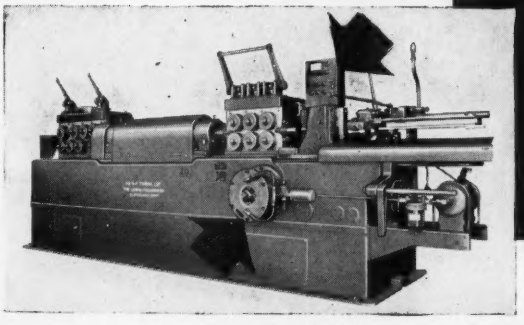
PRODUCTS OF FIRTH STERLING METALLURGY

High Speed Steels
Tool & Die Steels
Stainless Specialties
High Temperature Alloys
Sintered Tungsten Carbides
Firth Heavy Metal
Chromium Carbides
High Temperature Cermets
Zirconium

Better Quality Control*

LEWIS introduces the Air Clutch on wire straightening and cutting machines





Front view of No. 11-F Travel-Cut with Flying Shear Cut-off showing Air Brake "A" (with guard removed) and operating panel "B" with push-button controls for Air Clutch, Reeves Motodrive and flywheel speed Indicator Tachometer.

● Lewis engineers have added three important improvements to their famous Travel-Cut Machines for BETTER QUALITY CONTROL . . . These machines are already in service in America's leading steel and wire mills.

✳ Wichita Air Clutch permits higher cut-off speeds, eliminates shock of conventional clutch. No adjustment necessary . . . automatically compensates for wear.

✳ Wichita Air Brake eliminates conventional mechanical drag brake and is only engaged for a short portion of the cut-off cycle.

✳ Reeves Variable Speed Motodrive permits infinite adjustment of flywheel speed for perfect synchronization of the cut-off and wire feed speeds. This unique arrangement makes possible the cutting of rod WITHOUT SPOT SWELL . . . allows finer adjustment for cutting short lengths. Dial tachometer registers flywheel speed.

There are Standard Lewis Travel-Cut or Stationary-Cut Machines designed to straighten and cut all materials and shapes in wire or rod from .012" to ¾" at a wide range of feed speeds.

Air Clutch available on all Travel-Cut Models. Send for new brochure showing complete line of Lewis Wire Straightening and Cutting Machines.

LEWIS MACHINE COMPANY 3440 East 76th Street Cleveland 27, Ohio

the problem: ***how to produce* BUNCHED WIRE *with the smooth concentric qualities of stranded wire in a limited floor area?***

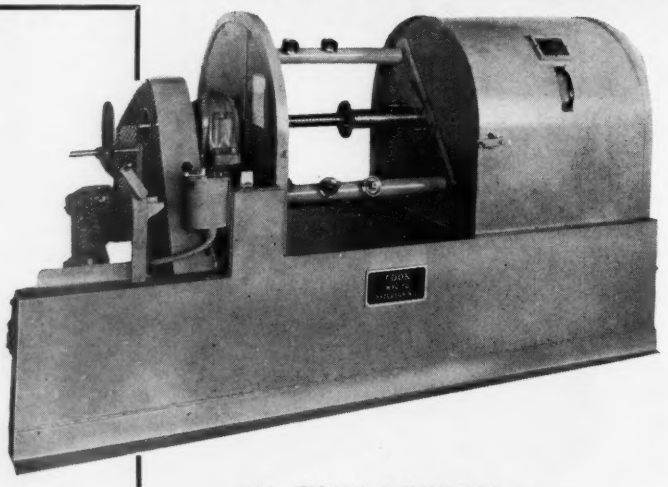
the solution: ***install a* COOK BUNCHER *with these features:***

HIGH SPEED

SINGLE TWIST FLYER

AUTOMATIC LAY CONTROL

LARGE TAKE-UP REEL



- *See Specification Chart below for the COOK BUNCHER most suited to your requirements.*

ALL COOK BUNCHERS have successfully formed bunched strands of 7, 10, 16, 19, 26, 41 and 65 wires with such concentricity as to enable its passage through an extruding die of only 1 mil clearance. In addition, such constructions as 27/36 and 41/36 have been bunched at high speed with perfect concentricity on these versatile machines.

- **CABLERS MODELS AVAILABLE IN SIZES UP TO AND INCLUDING REEL DIAMETERS OF 48 INCHES**

COOK MANUFACTURING COMPANY has a complete line of BUNCHING EQUIPMENT to accommodate the following reel sizes.

Model	Size	Capacity
B-H-8	8" x 6"	45 lbs.
B-H-12	12" x 8½"	90 lbs.
B-H-16	16" x 8½"	200 lbs.
B-H-21	21" x 8½"	350 lbs.
B-H-22	22" x 11"	500 lbs.
B-H-24	24" x 10½"	1000 lbs.

Capacity Based on Solid Copper Wire

- **Our Engineering Dept. is at your service to assist you in the solution of your wire problems—at no obligation of course.**

A Complete Line of Quality Machinery For The Wire and Cable Industry To Meet Rigid Specifications.

COOK MANUFACTURING CO.

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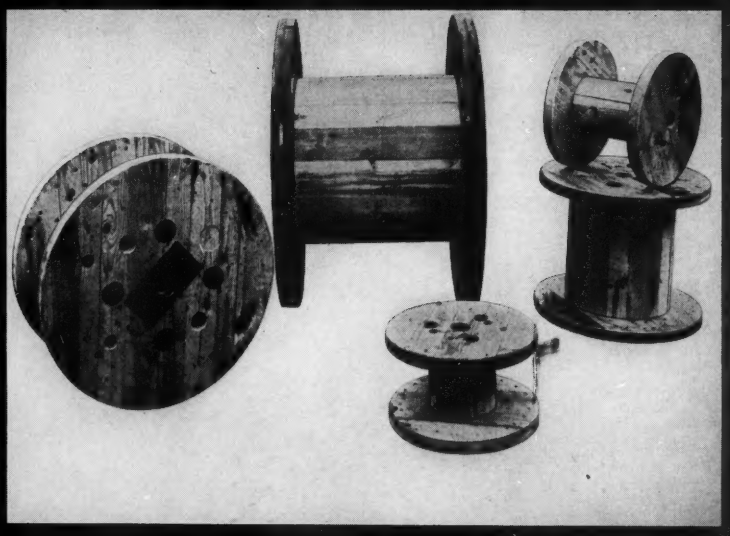
TORONTO CANADA

EUROPEAN AGENT:
CAPAMADJIAN LE MONNIER CIE LTD.
PARIS FRANCE

use
NON-RETURNABLE
wood
reels
for
all
sizes
and
types
of
electric
wire
and
cable



SHIP the modern way!

LOOK! at the ADVANTAGES

- REDUCED REEL INVESTMENT
- LESS STORAGE SPACE REQ'D.
- LOWER FREIGHT COSTS
- NO BOOKKEEPING
- NO REPAIR COSTS
- NO CASH DEPOSITS REQ'D.
- NO RETURN FREIGHT COSTS
- NO MORE HEADACHES!!!

NON-RETURNABLE REELS GIVE YOU A DEFINITE PACKAGING COST

HIGH SPEED
SHIPPING SERVICE in our . . . OWN TRUCKS
within a radius of 200 miles from the plant. Fast freight will bring you Bridge reels in 5 days or less east of the Mississippi.

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HAZARDVILLE, CONNECTICUT
Telephone . . .
Thompsonville, Connecticut
Riverview 9-8308

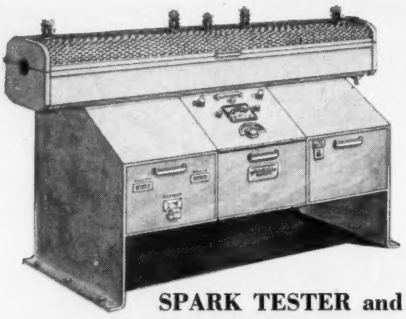
"REEL GOOD . . .
Let us quote on your reel needs. Send your specifications. Better yet, visit our plant and see how and why our reels are made so well at so low a cost.
WOOD REELS"

To Win Complete Satisfaction...

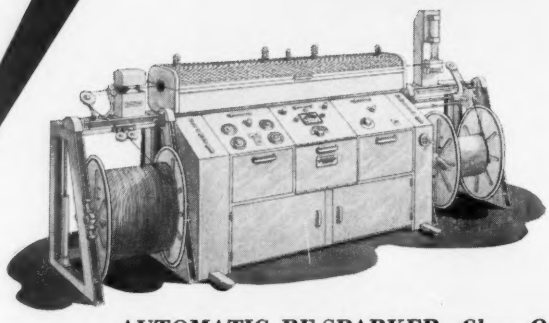
Put Your Money on

PERFECTION!

SEE FOR YOURSELF WHAT SUPERIOR JLE WIRE TESTING EQUIPMENT HAS THAT'S *MISSING* IN OTHERS!



SPARK TESTER and RECORDER, *Class J*



AUTOMATIC RE-SPARKER, *Class Q*

JUST COMPARE THESE FEATURES WITH ANY ON THE MARKET!

- Line Switch Cut-Out, Fused, and Circuit Breaker Control Switch with O.L. and S.C. Protection.
- Surge Relay and Resistor.
- Control Transformer (isolating) 230, 460, and 575/115V.
- Separate Transformer for low-voltage Tell-Tale Lamps.
- Double-Scale Kilovoltmeter.
- Auto. Operation of KVM Tell-Tale Lights.
- Low-voltage Panel Light for KVM.
- Three Fault Location Circuits and Three Fault Relays.
- All wiring in flex. steel conduit. All cords are Type S, not SJ.
- All wiring color-coded and wires plainly marked.
- Accessible Terminal Boards.
- Multiple Fault Lamps.
- Multiple Sparker and Electrode Danger Lamps.
- Safety interlocks on Electrode Guard and all Access Doors.
- All electrical equipment is chassis-mounted on Sliding Drawers.
- High-voltage Condenser in Test Circuit.
- Large, accurately machined Spark Gap.
- "No Spark" Lamp on Extruder Equipment.
- "Operator Call" Lamp on Re-Test Units.
- Silicone oil Time Delay Relay instead of electronic.
- Recorder furnishes printed record of number of faults in each reel.
- Recorder can print distance to each fault if required.
- Totalizing Counters give total faults and reels per day.
- Very heavy-duty Relays used which have high breakdown to ground.
- Excellent schematic and wiring diagrams of all machines.
- Permanent, exact records to facilitate purchasing replacement parts years later.
- On Re-Reeling and Coiling Machines, built-in D.C. Continuity Test Circuit is furnished.

ELECTRODE

- Petticoat Insulators instead of post-type. 80,000-volt wet flash-over.
- Stainless Steel Bead Chain, not monel or chrome brass. 3/16" beads.
- Straight-up lift of Electrode Chain Assembly. No tangling.
- Simple, easy to replace chain assembly.
- Heavy Condulets instead of outlet boxes for lamps.
- Colored Globes instead of colored lamps.
- Copper Drain Pans to remove moisture.
- Heavy, flanged, porcelain-eye Wire Guides.

When you invest in Wire Spark Testing and Re-Testing equipment, you have a right to expect engineering and design perfection in every detail for several very good reasons:

First . . . for the protection and safety of your personnel.

Second . . . to maintain the quality and reliability of your product.

Third . . . to avoid costly maintenance and enjoy years of trouble-free operation.

Fourth . . . to save time, labor, and valuable factory floor space.

Our experience, gained in over thirty years of designing and building testing equipment for the Wire Industry, enables us to bring you these superior advantages in our new designs.

Of course, it is easily possible to buy cheaper* equipment than JLE . . . and even possible to buy more expensive machinery . . . but it is impossible to buy better!

Over the fifteen to twenty year life of JLE equipment, the cost differential is insignificant and completely outweighed by superior performance!

***(Anyone . . . even we . . . can build cheaper equipment for you if you demand it . . . but WE STRONGLY ADVISE AGAINST IT!)**

Write, phone or cable for complete details.

James L. Entwistle Co.

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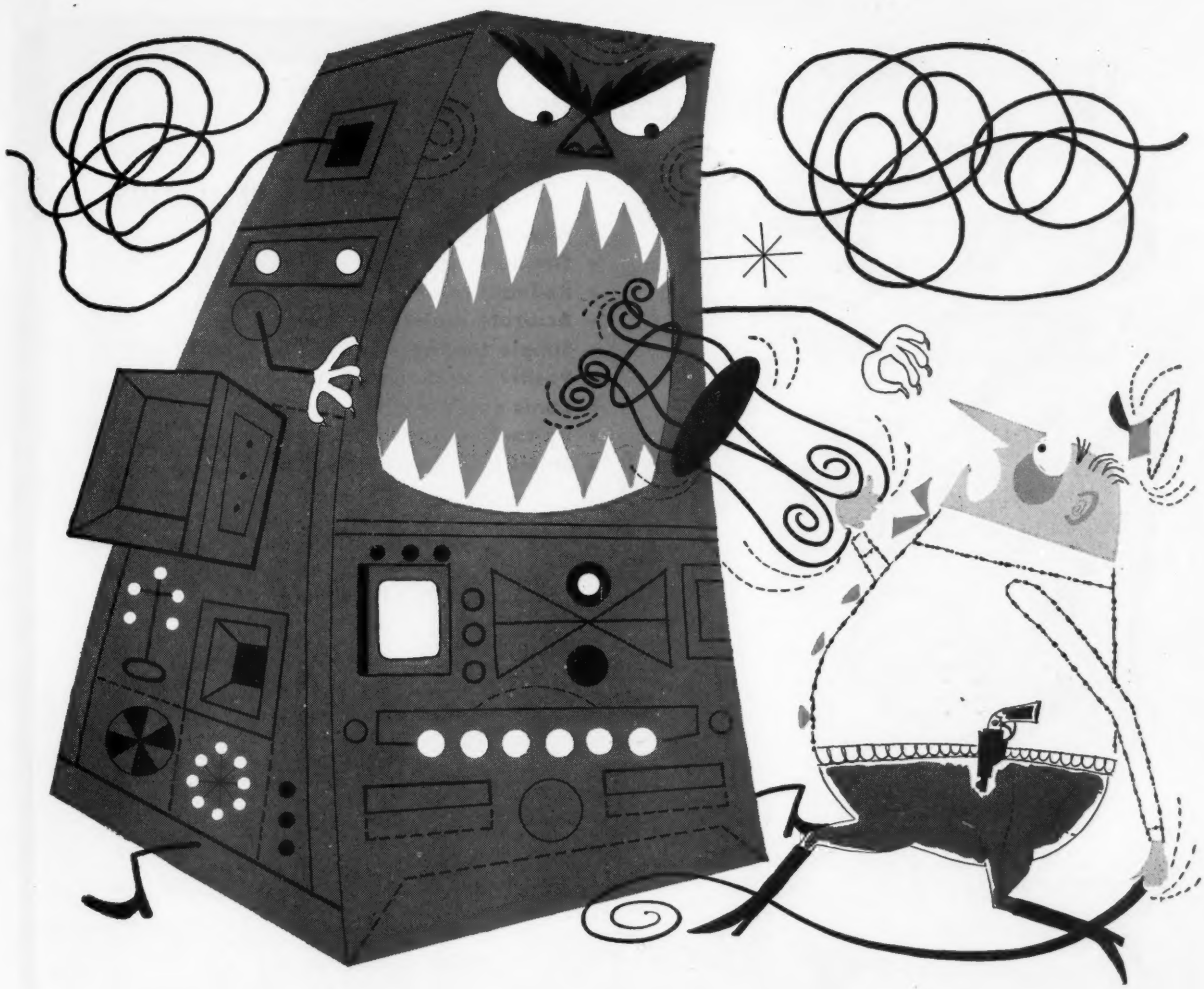
NOT CONNECTED WITH ANY FIRM OF SIMILAR NAME



Taming a wire fabricating machine?

Call American Steel & Wire!

Wire machines can be ornery. They seem to have a brain that delights in fouling up a high speed production line.

Very frequently, your American Steel & Wire representative can tame things down. With over a century of company experience behind him, he may be able to suggest a minor change in wire specifications, die construction or fabricating procedure that will solve the problem.

At AS&W, we *use* a lot of wire in our own plants, and have learned a lot of little tricks that are yours for the asking. Just call your American Steel & Wire representative.

AMERICAN STEEL & WIRE DIVISION
UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, O.
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS AMERICAN MANUFACTURERS WIRE

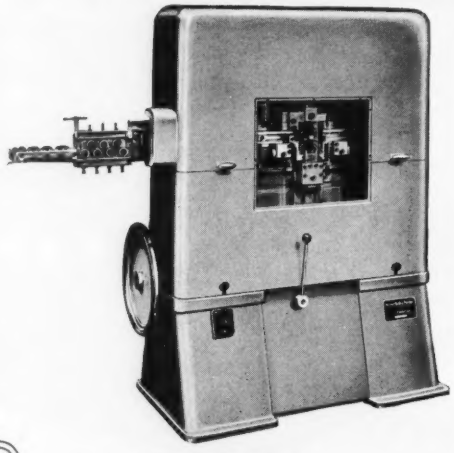
USS TRADE MARK

AMERFINE—*high quality fine wire.*
AMERSPRING—*music steel spring wire.*
AMERTEMP—*heavy-duty oil-tempered wire.*
AMERLOY—*alloy heading wire.*
AMERHEAD—*uniform heading wire.*
AMERSTITCH—*extra-tough metal stitching wire.*

UNITED STATES STEEL

ECONOMICAL PRODUCTION
DEPENDABILITY
UNIVERSAL APPLICATION

- High Output
- Simple Operation
- Reliable trouble-free working
- Accurate material infeed
- Simple tooling—easily accessible
- Positive guidance of slide movements
- Cams easily exchanged
- Up-to-date enclosed design
- Small floor space required



Fully automatic

UNIVERSAL MANY-SLIDE FORMING MACHINES

type UB

(Five models for the production of mass-produced articles in *round wire* up to 5/32" dia. and *strip material* up to 13/16" wide. Wire infeed up to approx. 24".)

OUTPUT

120-300 pieces per minute, according to shape.

▼ WRITE FOR BULLETIN ▼

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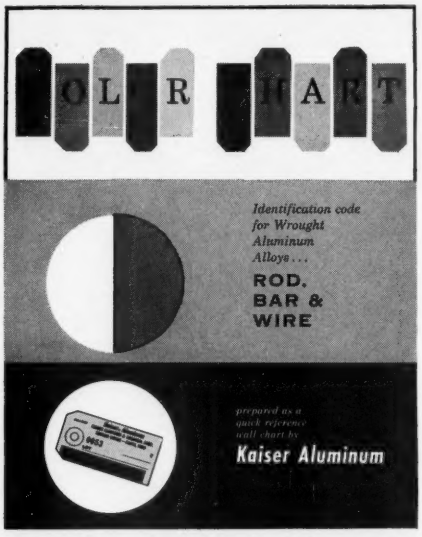
MASCHINENFABRIK GmbH, KOELN-RADERBERG/GERMANY • ESTABLISHED 1870
Machines for the mass-production of articles from wire and ribbon metal • Automatic Chain Making Machines • Wire Straightening and Cutting Machines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HYPREZ

High Precision DIAMOND COMPOUNDS

Serving many of the foremost plants in the wire industry, New Jersey Carbide Die Co., of Jersey City, uses Hyprez exclusively for rough finishing, lapping and polishing tungsten-carbide dies.

The continuing preference for Hyprez is built upon Hyprez superiority—maintained by research and control; by fast free-cutting action of pure diamonds precisely graded and uniformly dispersed in scientifically formulated vehicles. Hyprez provides the exact grade and concentration for every job.

For economy of production and for finish to exact specification, New Jersey Carbide Die Co. uses Hyprez exclusively

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ENGIS EQUIPMENT COMPANY, CHICAGO 5, ILL.

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It's outstanding!

EVERY MANUFACTURER who tries Roebling high carbon flat spring steel discovers the same thing... that this spring steel is absolutely unexcelled for dimensional and mechanical uniformity... for speeding production and cutting down rejects.

You always *pay* for the best when you buy flat spring steel... make sure you *get* it by specifying Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J.

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Check These Features of

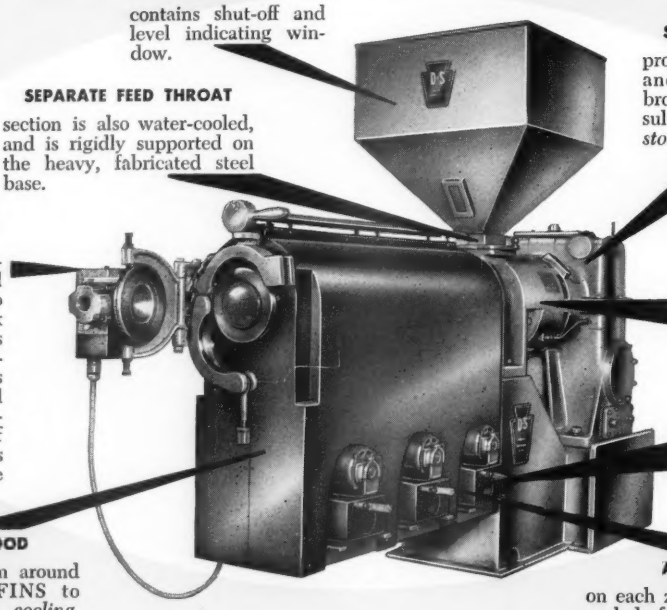
THERMA-FIN EXTRUDERS*

FEED HOPPER
contains shut-off and level indicating window.

SEPARATE FEED THROAT
section is also water-cooled, and is rigidly supported on the heavy, fabricated steel base.

"STREAM-FLO" CROSSHEAD
has quick opening clamp, and is hinged to facilitate quick servicing. This electrically heated crosshead has been designed so that a minimum amount of compound is carried in the head.

BLOWER HOOD
deflects air stream around the THERMA-FINS to provide *uniform cooling.* Hood contains an inner stainless steel liner insulated from the outer cover.



SMOOTH FLOW OF POWER
provided by hardened worm and special high capacity bronze worm wheel drive results in *steady, non-pulsating stock screw drive.*

THRUST HOUSING
section is water-cooled, and contains a rugged steel thrust sleeve that is supported on heavy-duty roller thrust and radial bearings.

BLOWER
of large capacity cools each heat zone. Temperature of each heat zone is controlled independently.

ADJUSTABLE DAMPER
on each zone controls amount of natural draft or blower capacity. Closed oven effect is created by closing dampers and shutting blowers off.

OTHER OUTSTANDING FEATURES:

● **DAVIS-STANDARD® THERMA-FINS,** which clamp over the cylinder in each zone, are deep-finned, aluminum castings with cast-in calrod range type heaters of ample capacity.

● **STOCK SCREW** of constant lead and diminishing depth is made of special alloy steel. Flights are hardened, and entire polished surface is protected by hard chrome plate. Water cooling fixture is provided for hollow screw.

● **PROPORTIONING TYPE INSTRUMENTS** automatically maintain accurate temperature control.

● **SHOCK-MOUNTED CABINET** houses temperature control instruments and the blower control switches.

● **STANDARD AND SUPER MODELS** available in 1½", 2", 2½", 3¼", 4½", and 6" bore sizes.

* U. S. Patents Pending

DAVIS-STANDARD

Division of FRANKLIN RESEARCH CORPORATION

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IN EUROPE AND THE STERLING AREA, CONTACT FINNEY PRESSES, LTD., BIRMINGHAM, ENGLAND

Are You Drawing Copper Wire Directly

from .250" down to .0315"?

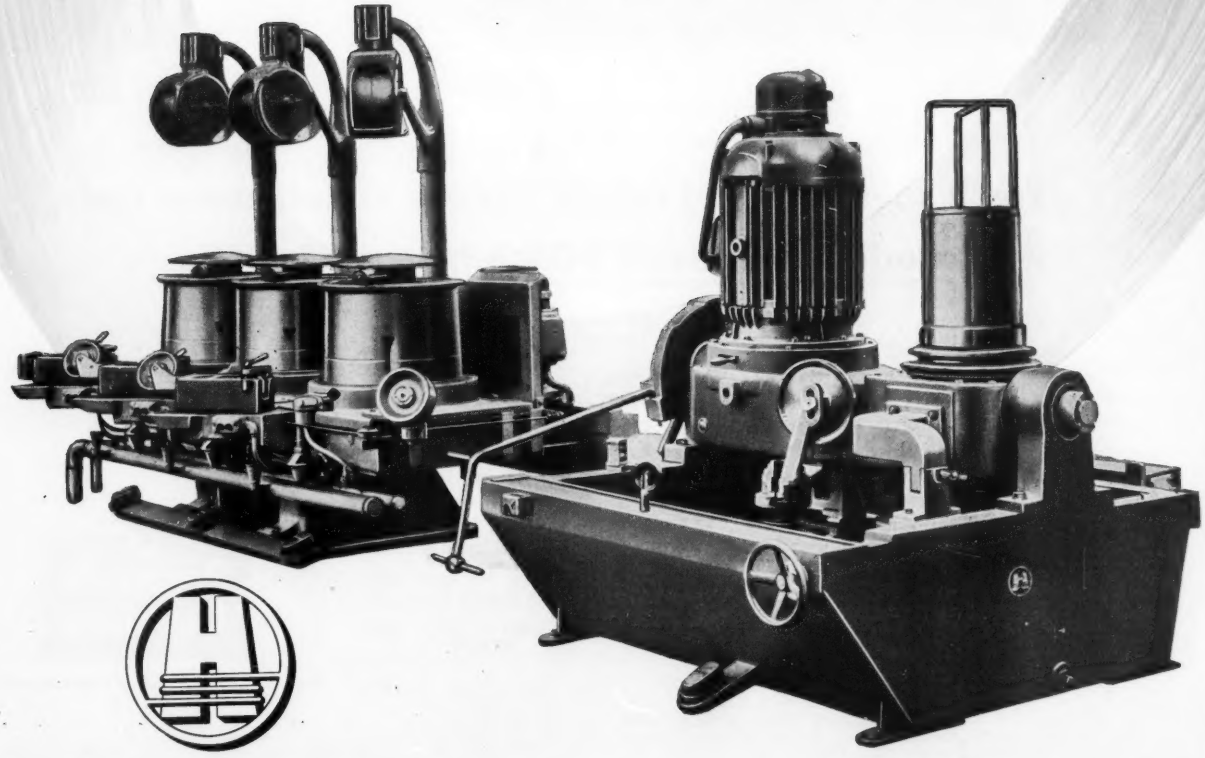
For this range, we recommend our

NON-SLIP/SLIP WIRE DRAWING MACHINE
MODEL G II/TF II D

The advantages of this combination of machines are as follows:

1) Drawing proceeds without interruption in one operation
2) Lower costs through combination of two operations
3) Finished wire with bright, flawless surface

Please submit your inquiries, we shall be glad to quote on your particular wire drawing problems.



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GERMANY

Sole Representative in the U. S. A.:

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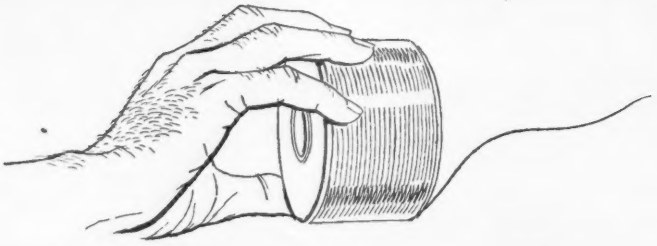
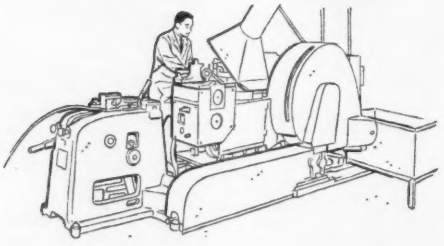
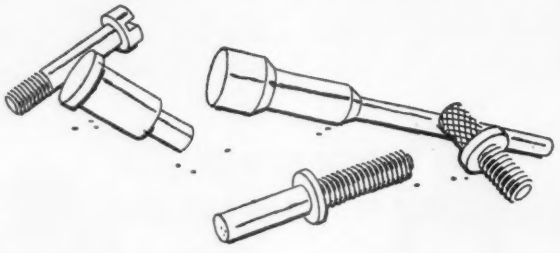
Fine wire drawing?



Cold heading?



Cold forming?



You'll save time, cut rejects, reduce maintenance costs with modern Pennsalt FOS lubricants!

Die life increases, shop cleanliness improves, finishing rejects fall off startlingly —when you use wire, rod, or tube stock *pre-coated* with Pennsalt FOS lubricants for cold working.

DRAWCOTE®, FOSCOAT®, and FOSLUBE® —the principal FOS Process chemicals— can be applied long before they're needed —in fact, many wire-stock suppliers apply FOS lubricants before shipping. There's no need to recoat stock before drawing, no need to apply wet, messy, unpredictable lubricants at the press. Your finishing rejects become a trouble of the past and your die life can be increased up to 600% . . . all because of Pennsalt FOS Process lubrication.

INVESTIGATE! Have your Pennsalt man show you how FOS dry lubricants can speed your production, save you die costs, save you metal stock. Call him or write Metal Processing Dept. 293, Pennsylvania Salt Manufacturing Company. East: Three Penn Center Plaza, Philadelphia 2, Pa.; West: 2020 Milvia Street, Berkeley 4, Calif. In Canada: Pennsalt Chemicals of Canada, Hamilton, Ontario.

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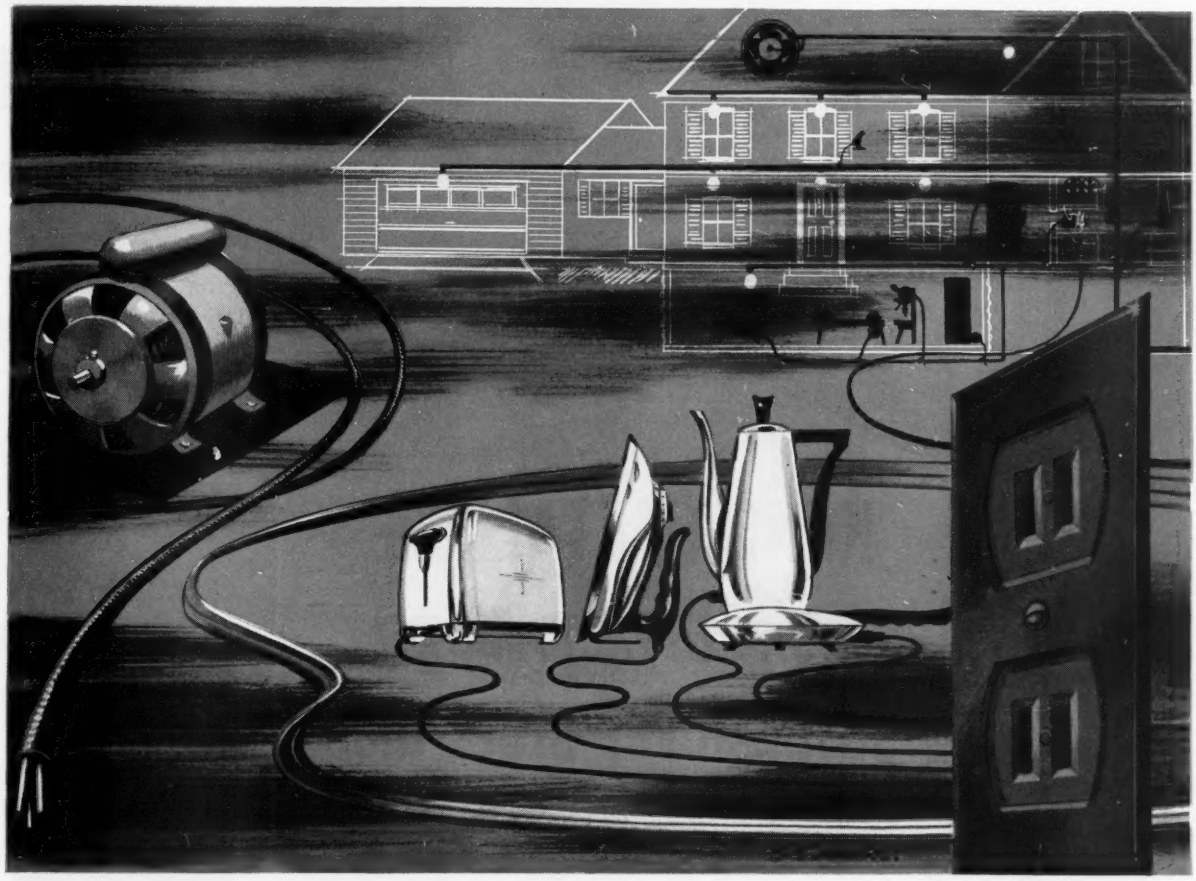
Metal Cleaners • Phosphate Coatings • Cold-Working Lubricants

A BETTER START FOR YOUR FINISH

Naugatuck MARVINOL

POLYVINYL CHLORIDE RESINS



four resins for electrical application

NAUGATUCK now offers the Wire and Cable Industry *more* PVC resins for insulation extrusion than does any other resin manufacturer.

Two of these Marvinol® resins, VR-22 and VR-23, have already received UL approval. These resins are, respectively, of high and intermediate molecular weight. Both have good dry blending properties.

Marvinol VR-24 and Marvinol MX-2206 are resins of lower molecular weights. They provide high volume resistivity in semi-rigid compounds with little or no plasticizer. Both deserve your careful evaluation for future electrical products.

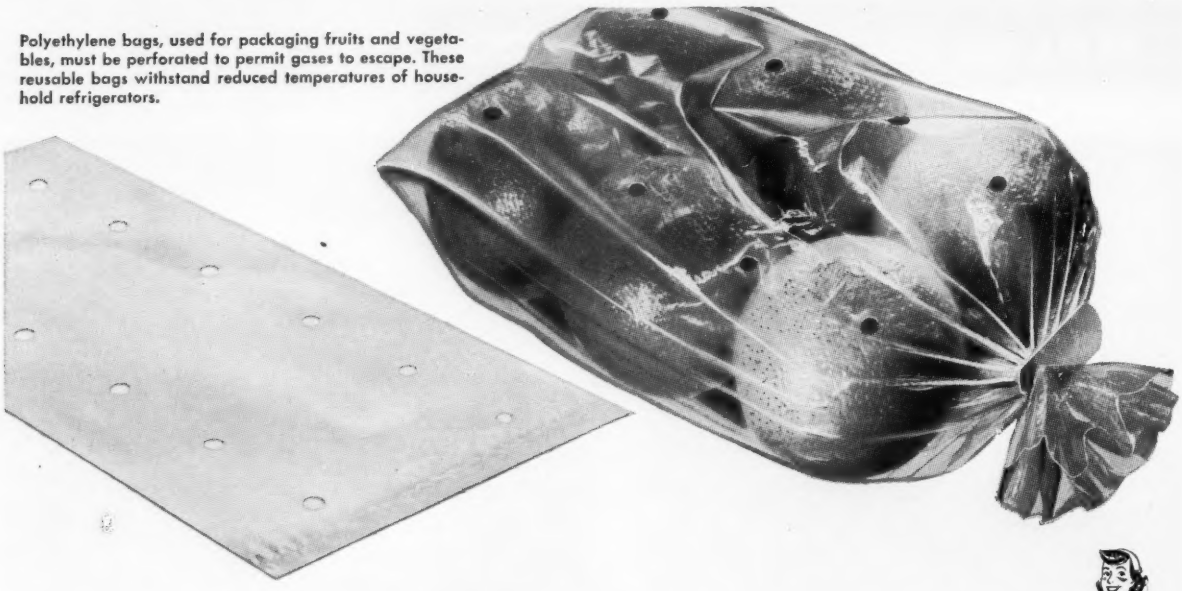
Check with your Marvinol technical representative for complete data and evaluation samples, or write us on your firm's letterhead.

United States Rubber

Naugatuck Chemical Division

Naugatuck, Connecticut

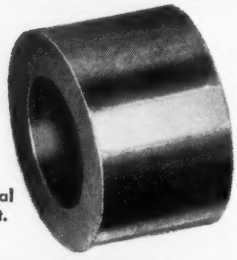
BRANCHES: Akron • Boston • Gastonia, N. C. • Chicago • Los Angeles • Memphis • New York • Phila.
IN CANADA: Naugatuck Chemicals, Elmira, Ontario • Rubber Chemicals • Synthetic Rubber • Plastics • Agricultural Chemicals • Reclaimed Rubber • Latices • Cable Address: Rubexport, N. Y.



Polyethylene bags, used for packaging fruits and vegetables, must be perforated to permit gases to escape. These reusable bags withstand reduced temperatures of household refrigerators.

KENNAMETAL* die perforates polyethylene bags with big saving over steel dies

Longer production runs . . . less machine downtime . . . fewer bag rejects . . . longer service life of dies



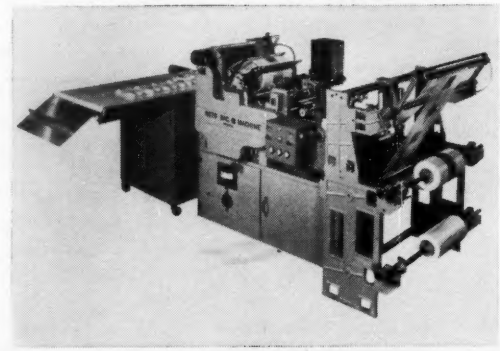
Kennametal Die Insert.

More and more fruits and vegetables are packaged in perforated polyethylene bags. The perforations permit gases to escape and help to prevent early spoilage. Housewives like these bags because they are reusable in the home.

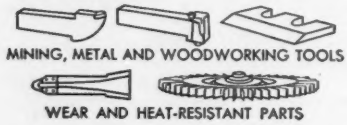
A Die Part of Kennametal is used with the cam-operated, spring-loaded piercing ball which perforates the polyethylene sheeting in the bagging machine (illustrated at right). Savings realized by users of the machine include longer continuous runs, reduced machine downtime and less wastage of polyethylene bags due to ragged holes. In addition, Kennametal permits more regrinds of the die than is possible with steel dies.

Why not choose Kennametal for your die work. In addition to six tungsten carbide grades, three exclusive tungsten-titanium carbide grades with unique properties are available for forming and sizing operations where galling or pickup cannot be tolerated. From these nine grades you can meet any specific requirement and be assured of highest production rates, accurate dimension, uniform finish, and low die maintenance. Kennametal engineers will gladly work with you or your die maker in applying the right grade for best performance. See your Kennametal tool engineer or write KENNAMETAL INC., Latrobe, Pennsylvania.

*Trademark



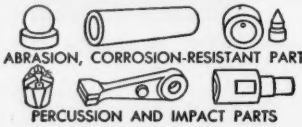
A view of the Roto-Bag machine which is equipped with dies made of hard, long-lasting Kennametal.



MINING, METAL AND WOODWORKING TOOLS

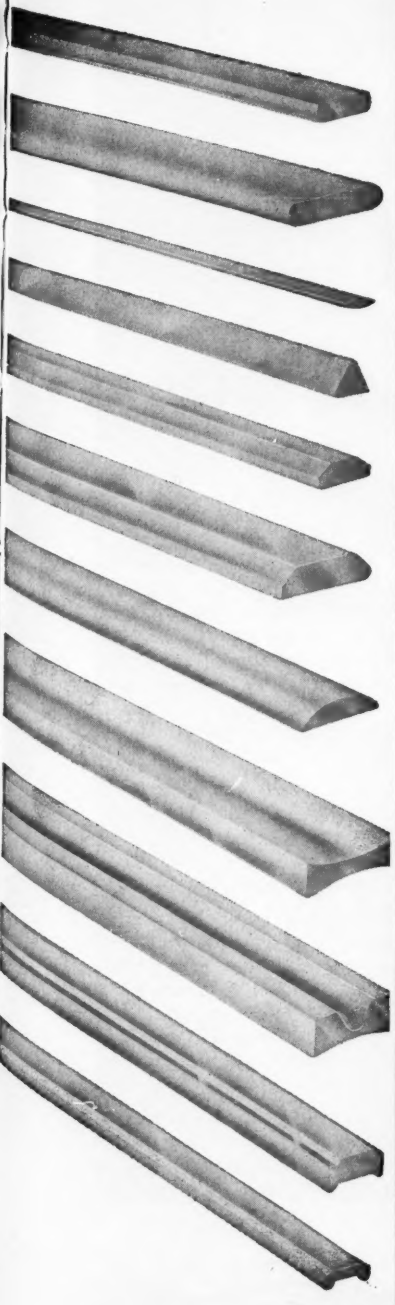
WEAR AND HEAT-RESISTANT PARTS

INDUSTRY AND KENNAMETAL ...Partners in Progress



ABRASION, CORROSION-RESISTANT PARTS

PERCUSSION AND IMPACT PARTS



NATIONAL

WIRE

(COLD ROLLED)

in Coils or Straight Lengths

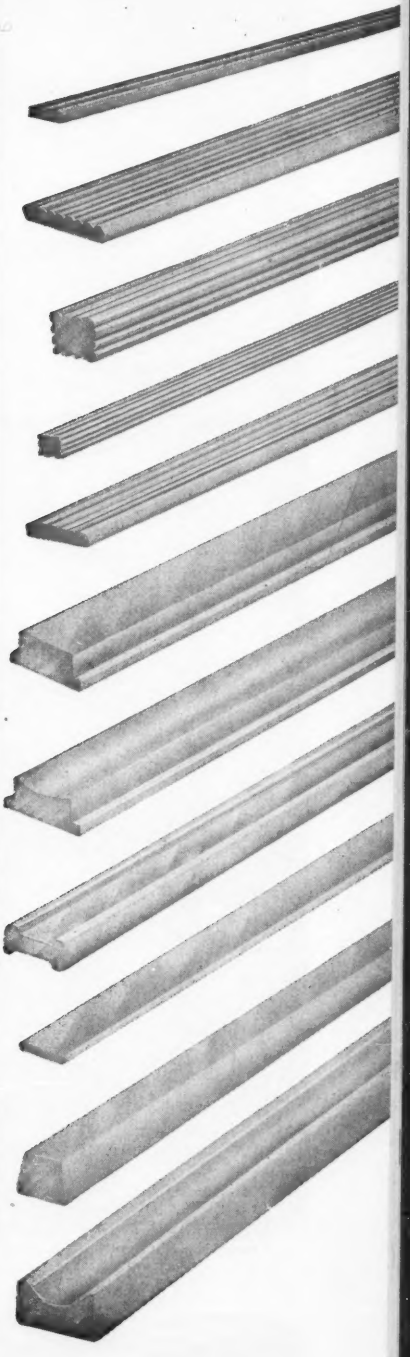
COMPLETE METALLURGICAL SERVICE

Manufacturers of

SPRING WASHERS	RETAINING RINGS
ROUND EDGE FLAT WIRE	KEYSTONE SHAPED WIRE
SQUARE EDGE FLAT WIRE	SPECIAL SHAPED WIRE

Shaped Wire in Coils or Straight Lengths, Ferrous or Non-Ferrous.

LARGE OR SMALL QUANTITIES



Manufactured by

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PRECISION SHAPED WIRE DIVISION

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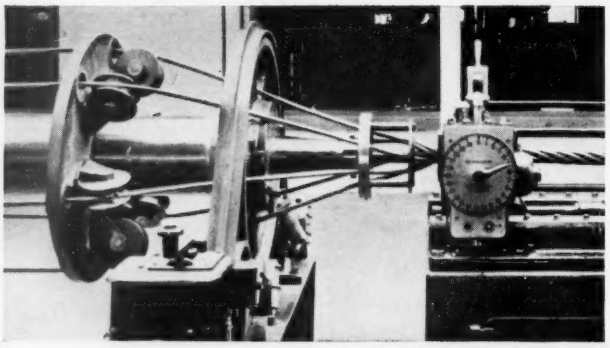
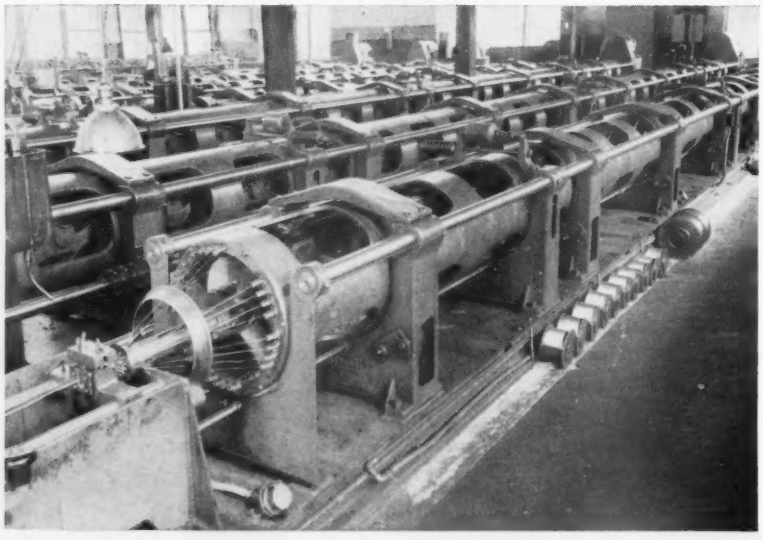


This machine is capable of "closing" strands to make wire rope up to 3½-inch diameter. Six strands are closed around a core of either fiber or wire rope.

YOUNGSTOWN "YOLECTRO" ROPE WIRES

. . . *built-in strength and safety keep your wire rope quality high*



This bank of rotary stranding machines are busy producing wire rope at the St. Louis plant of H. K. Porter's, Leschen Wire Rope Division. Coils of wire are set in the open bays of the machines and conducted to the closing dies along the circumference of the barrel. They form from 7 to 61 wires into strands which are "closed" into a wire rope. Usually, finished wire rope consists of 6 or 8 strands closed around a core.

Wire rope must give long, trouble-free service or it's definitely a bad investment—both from a cost and a safety standpoint. To maintain their product quality, leading rope manufacturers specify Youngstown Yolectro High Carbon Rope Wire because it offers:

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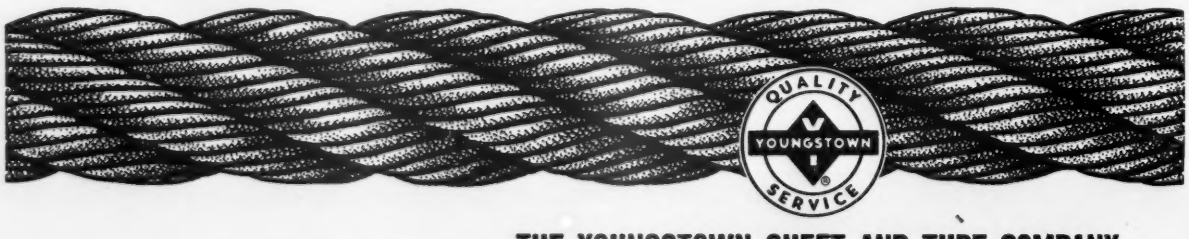
Yes, this special, quality-controlled Youngstown wire provides the correct balance of properties to meet your most critical requirements. Why not make it your specification? It's available in both Bright and Galvanized finishes in all high carbon grades.

For additional information or metallurgical assistance, write or phone today to your nearest Youngstown District Sales Office.



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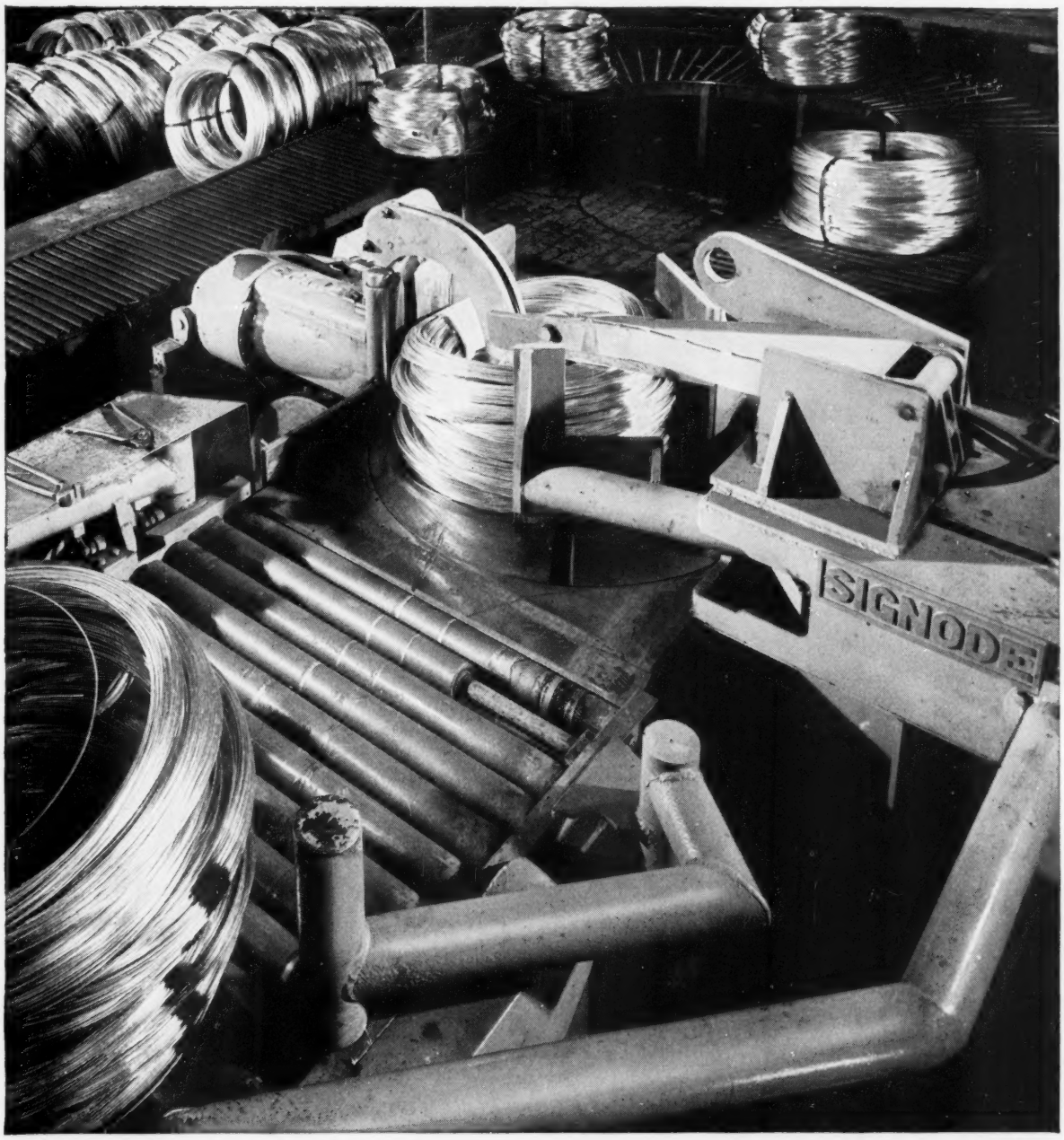

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The Wire Outlook

Widespread good business activity is everywhere apparent, given another impetus by the happy outcome of the reelection of the President. Confidence, as a result of balloting having transcended party lines, will remain high and make for fresh advances before the year winds up.

In the third quarter national output climbed to a record $413 billions and has risen $11 billion since the end of 1955, with personal incomes at an all-time new peak in the aggregate. Higher consumer purchases of goods and services, coupled with mounting state and local government outlays for schools, roads, hospitals and other public works, and the heavy spending for new productive equipment have contributed to the rise. As long as consumers are willing to spend as their incomes increase, this expression of confidence will keep the national economy buoyed and prosperity will be the order of the day.

Some time back President Eisenhower expressed the belief that the country could achieve a 500 billion dollar production goal by 1965. At the present rate of growth, the objective is well ahead of schedule. It should be noted, however, that all of the increase cannot be attributed to volume of physical production, for costs and prices have been climbing and a goodly percentage of the accretion to national income has resulted therefrom. This is inevitable because of the foundations for inflation laid by previous administrations. The national debt, though, is beginning to assume a more reasonable relationship to income.

The problems of the Middle East and Europe continue to cast long shadows across the world, but if any factor is able to resolve them successfully, it will be that of the good offices of our President, who is perhaps the one best qualified by experience, standing and influence to help bring order out of this unfortunate chaos.

The borrowing spree of consumers appears to be abating and installment loans are running at a lower rate. Repayments on past loans are proceeding in an orderly manner, the net result being that consumer borrowing is not adding to the inflationary trend. Total consumer debts outstanding in September was just slightly over 40 billion dollars. To hold it there, money will be kept tight.

Manufacturer's wire is not difficult to get, but deliveries running a month to a month and a half, with specialty wire orders taking up to 3 months to secure. Merchant wire products in this off season are also offered on longer than usual deliveries, but are available. Wire rods are tight. Spring wire orders are spotty and cold heading wire is in good supply. Fastener concerns are not buying ahead, making for better supply.

Aluminum wire, contrary to what was reported in October, can be delivered promptly, due to large capacity increases. Because of its availability and growing popularity for many applications, aluminum consumption is bound to make healthy gains.

The resounding success of the Annual Convention of The Wire Association in Pittsburgh has been a great satisfaction to the Association's directors and a tribute to the skillful planning of the Program Committee. Always international in tone through attendance of persons from the far corners of the earth, it is gratifying to note that, in spite of differences in race and tradition, we all have the same problems and employ pretty much the same processes, when it comes to making wire or products made from wire.

Our country has become the most prosperous the world has known and the eyes of other nations are ever upon us. One fine characteristic of American wire men is their willingness to share their knowledge with fellow wire people elsewhere. As our overseas neighbors develop and meet the needs of their own economies, it should go a long way toward stabilizing world conditions—for this our industry can be grateful to have been doing its bit.

Edmund Duval Sickels

EDITOR

to the friends we've made
and the ones we hope to make—
a very

MERRY CHRISTMAS

—and a prosperous New Year!

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DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 31 December, 1956 No. 12

Industrial Diamonds in the Wire Mill

by Leonard A. Zucker
President
Union Wire Die Corporation
New York, New York

There is a certain aura of romance about diamonds which always seems to generate quite a degree of interest in articles about them. After all, the diamond does remain unsurpassed after centuries as the most valuable and sought-after precious stone. Nature has been very generous to the diamond by endowing it with two unique physical properties which have resulted in its prized position: it is the hardest substance on the face of the earth and it has the highest refractive index. Man has added one more facet, and a very important one: the value of gem diamonds is constantly maintained by a monopoly that controls the diamond field.

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In industry there is just no romance at all attached to diamonds. Every single industrial carat must justify its use by equal or greater savings in labor-cost, production or quality, in an unending competition with softer, lower first-cost materials. Diamond products have a higher first-cost because of two quite simple factors: The inherent difficulty of working with a very hard material, and the initial high cost of the diamond itself.

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As to the first cost, there is a widespread belief among users of industrial diamonds that prices could be diminished considerably if not for the monopoly control mentioned before, just as prices of gem diamonds would surely drop if they were freely permitted to seek their own level. To determine the validity of this belief, it would be of interest to have a broad look at the operation of the so-called Diamond Syndicate. This will, perhaps, give a clearer picture to those who have heard of the Syndicate but have only a hazy idea of its position, operation and effect.

Leonard A. Zucker

In this paper Mr. Zucker has slanted the use of diamonds in the wire mill toward the drawing of ferrous wires, covering the product both as diamond abrasives and diamond wire drawing dies.

The paper was delivered on October 30, 1956 at the Annual Convention of the Wire Association in Pittsburgh, Pa. Mr. Zucker graduated from Columbia College in 1935 with an A.B. degree. He started with the Union Wire Die Corporation in 1938 and has been with the company ever since, having been elected President in 1951.

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97% of the world's diamonds come from the continent of Africa. All of the mines of the Union of South Africa are either owned outright, controlled or leased by the DeBeers Consolidated Mines, Ltd. and affiliated companies. Diamond mines elsewhere on the African continent than in the Union of South Africa are almost all under long-term contract to sell their output to a company called the Diamond Corporation, which is wholly-owned by DeBeers. Included in this arrangement is the prolific Belgian Congo, which last year produced 60% of the total diamond output. Through these intertwined companies, DeBeers controls production and sale of about 95% of the world's diamonds. Except for the goods that remain in Africa for use, the diamonds are shipped to London for distribution. Those stones which by virtue of their color and purity are destined to be cut into

gems are marketed by a company called the Diamond Trading Company; all other diamonds automatically become industrials and are marketed by the Industrial Distributors Sales Ltd. The latter two companies, both of course controlled by DeBeers, set the sales prices and allocate quantities, and it is these two London companies which are conventionally known as the Diamond Syndicate.

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The manner in which Industrial Distributors Sales Ltd. distributes diamonds to its customers is a model of a controlled market. The buyer, if he is one of the chosen few, is periodically offered what is called a "sight", which is trade parlance for an offering to sell. The grades, quantities and prices are substantially determined by the seller. If a buyer does not like his sight, he need not buy, but he is not offered a different selection, and there is no haggling over price. As a matter of practice, he buys. A typical industrial sight contains several qualities of diamonds, with appropriate prices, ranging from crushing boart to solid clean stones. The Syndicate makes its assortments quite general, so the importers further assort the goods, segregating parcels of stones for varieties of industrial uses. In one parcel of so-called dresser stones sent from London there will be found die stones on down to pieces of cleavage; thus even though the Syndicate maintains the same descriptions and prices over many sights, they can actually raise or lower effective prices by diminishing or upping the quantity of higher value diamonds within the usual categories.

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In dealing with a monopoly which never floods the market, never has to look for customers and never has price wars, it is only natural to draw the conclusion that prices are pegged at unreasonably high levels. In the case of industrial diamonds, as opposed to gems, this is just not so. The cost of mining diamonds is extremely high. It is necessary to remove anywhere from 4 to 8 tons of mined earth for each single carat of diamond produced; then the removal of the diamonds from this immense amount of earth is a painstaking and costly process. Since there is absolutely no way of knowing what manner of diamond will next emerge from the earth, it is clear that it costs exactly as much to mine the lowliest piece of crushing boart as it does the most glittering blue-white gem stone. If the Syndicate did not peg gem diamonds at stable high price levels, the cost of industrial diamonds would be prohibitive, beyond the possibility of economical use. The monopoly control exercised by the Syndicate puts the burden on gems to the benefit of the industrials, and a simple statistic proves this: last year only 18% of all diamonds mined went into gems, but they yielded 72% of the Syndicate's revenue.

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It is true that in times of deflation or depression the operation of the Syndicate can prevent industrial diamonds from dropping freely. However, we have experienced an inflationary cycle lasting almost 20 years, and the Syndicate has tried earnestly to prevent the prices of industrial diamonds from going through the roof. A close study would undoubtedly show that prices for industrial diamond products have not risen over this period by a proportion warranted by the decline in the value of the dollar.

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The other factor which gives an initially high cost to diamond products is the simple inherent hardness of the diamond. It is basic that the hardness of a material increases the difficulty and cost of machining. Moreover, the high cost of the raw material leads to the production of small components, the dimensions of which practically always have to be kept to close tolerances. The hardness and the tolerances dictate that operations in the shaping and handling of diamonds are necessarily expensive.

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The result of the higher first price is that diamond products are restricted in their uses to the performance of work which other materials cannot do economically or at all. Broadly speaking, the diamond has two uses in the wire mill, as an abrasive and as a tool. The latter category, of course, covers the diamond die. The former includes diamond powder, diamond compound, cutting stones and diamond wheels. Diamond wheels in a number of industries would be considered as tools, but their place in the wire mill is under the heading of abrasives.

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The use of diamond as an abrasive came of age with the development and vastly increased use of tungsten carbide. In the early days of tungsten carbide it was believed that this new hard material would replace the diamond. Actually it did in some areas where solid diamonds had been used. However the necessity for truing, turning, and otherwise working carbide so increased the demand for powdered diamond that the use of diamond boarts has vastly more than equalized in carats and dollar value any losses to tungsten carbide. The use of diamond as an abrasive in the wire industry conforms with general usage in that it is largely confined to the working of tungsten carbide, principally on drawing and heading dies.

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In what applications is it more economical to use diamond rather than some softer and less expensive material? First it must be mentioned here that in the recutting of diamond dies, of course diamond powder is the only abrasive possible as only diamond cuts diamond. On tungsten carbide, generally speaking it is economical to use an abrasive other than diamond if the cutting or grinding set-up allows for rigid and strong application of the abrasive with plenty of opportunity to replenish the abrasive material.

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To illustrate this, consider what happens when a silicon carbide grinding wheel, the well-known "green wheel", is used in grinding tungsten carbide. Actually the use of wheels in the wire industry is not as great as the use of powder, but the study of the action of the

green wheel on tungsten carbide gives a graphic picture that sheds light both on wheels and powder. The silicon carbide particles in the wheel are only slightly harder than the tungsten carbide. As a result of the proximity of hardness, there is a rapid dulling of the silicon carbide particles as the grinding of the tungsten carbide proceeds. To counteract this, the green wheel is manufactured with a bond that allows a constant shedding of the abrasive particles from the wheel so the dull ones can escape and new sharp cutting edges presented to the work. If there is a large volume wheel, it can be used efficiently because the lineal wear on such a large volume is small. On the other hand, in the performance of I.D. work where of necessity smaller volume wheels must be employed, wear is extremely rapid. This wear is accelerated further by the high-speed rotation which is essential for an efficient cutting rate. As diametrical wear on the wheel increases, speed of cutting decreases because of the diminished ratio of wheel diameter to opening; for optimum efficiency this ratio should be kept at 75%. In addition to the loss of efficiency, there is often distortion of the work due to tapered or uneven wheel wear. Diamond wheels, with their very much slower rate of wear, are not subject to these disadvantages on inside work. Since a large percentage of wire mill grinding is on I.D. operations, the use of diamond wheels outstrips the use of softer wheels in die rooms by a considerable margin.

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Where adequate motor force and wheel periphery are feasible, green wheels can be advantageously used, as for example in the grinding of the O.D.'s of small wire die nibs for press-fit setting; grinding of the concave, though not the convex, surfaces of side and end blocks, particularly if both steel and carbide are exposed to the wheel; breaking very sharp edges on tungsten carbide compacts, as in 2-piece closing and stranding dies; and crush grinding of mandrel bearings. Diamond wheels pay for their considerably higher cost on such operations as I.D. grinding of round dies from 3/4" and larger, including angle, bearing and relief; grinding of the angles on dies smaller than 3/4" where the angle tolerance is in minutes rather than degrees; grinding the tapers on the O.D.'s of heading die nibs since a high degree of accuracy is needed for the cold-press method of setting heading die nibs now in general use; grinding the faces of deep draw dies where the carbide insert is flush with the steel; and transferring a specific contour to special carbide applications, such as the so-called reduction area on mandrels.

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The identical principle applies in the determination of when to use diamond powder rather than silicon carbide or boron carbide powder in roughing, smoothing and lapping of tungsten carbide round and shaped dies. When abrasives softer than diamond are used, the reciprocating action which is common to virtually all die servicing equipment rapidly breaks down the abrasive particles and dulls them, exactly as described before in the operation of the silicon carbide wheel. Unlike the green wheel, there is no built-in reservoir of replacement particles, so new powder must be added, either by frequent changing of the compound in machines with pumping set-ups or by the manual addition of powder. Thus the utilization of non-diamond abrasives has proven economical wherever there exists the potentiality of constant replenishment of the abrasive, without the necessity for stopping the operation of machinery and where the abrading is performed mechanically and not manually.

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The types of automatic ripping machines now in service in wire mills generally meet these requirements, with the result that the ripping operation is commonly performed with the use of abrasives other than diamond. Our own practice at Union Wire Die is to use silicon carbide as the abrasive on multiple-spindle ripping machines with pumps; this covers the range of sizes from 3/4" down to about .080". Below .080" drilling is usually done on the familiar 10-spindle machine with boron carbide. All shape die ripping is done on automatic single-spindle rippers to about .006" from size with boron carbide as the abrasive. In line with the previously stated principle that to derive suitable production from non-diamond abrasives it is necessary to obtain maximum force rigidly applied to the work, we have developed a shape die ripper with a hexagon spindle guided by six ball bearings running on the hex flats. The elimination of the play inevitably found in cylindrical spindles affords the necessary force and rigidity.

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Diamond powder is not totally excluded from the ripping of carbide dies. It frequently is economical in die rooms where there is only one spindle employed in ripping dies in the range up to 1/4", requiring the full-time attention of one operator. Assume an hourly wage for such an operator of $2.25, and add 100% to that for vacations, social security, holidays, supervision and general overhead, for a labor cost of $4.50 per hour. This is equal to 15¢ every 2 minutes; 1/20th of a carat of diamond powder at $3.00 per carat also costs 15¢. If the operator is not doing any other work while the ripping is in progress, 1/20th of a carat of #45 diamond powder can save that two minutes, not to mention that some of the diamond can be reclaimed. Another area for ripping with diamond powder is in the production of heading dies; if the opening will not allow a diamond wheel to enter, our practice at Union Wire Die is to rough with a tungsten carbide drill and then go right to a #45 diamond powder. Still another use is in the ripping of small wire dies which are to finish at .025" or smaller. Very often the smoothness of finish yielded by ripping with boron carbide is not adequate to insure the maintenance of final size, in which case diamond powder is necessary.

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This fact of diamond powder yielding smoother finishes not obtainable with other abrasives spotlights the area where diamond powder is all alone in the field—the

(*Please turn to page* 1498)

Zirconium

by Malcolm F. Judkins
Manager
New Products Division
Firth Sterling, Inc.
Pittsburgh, Pennsylvania

This paper was presented at the Annual Convention of the Wire Association in Pittsburgh, Pa., on October 30th, 1956. In it the author gives some historical background, together with information on its refining, processing and uses. It is only recently that this metal has become available in commercial quantities even though there is only one customer— the U.S.A.

The technology on which our civilization has been built demands new metals having special and unique properties. We are a metal using people. Of the 100 chemical elements, 83 are metals. Only 28 are of tonnage importance. An additional 28 are of minor importance and the remaining 27 are nearly unknown. Up to the year 1600 we struggled along with only seven metals, gold, silver, copper, tin, iron, lead and mercury. By 1900 we had added tungsten, chromium, aluminum, magnesium, molybdenum, germanium, titanium and zirconium. Today, to use a much overworked phrase, in the so called "jet" or atomic age, we are concerned with uranium, plutonium, beryllium, niobium, thorium, cobalt, boron, hafnium and a host of other exotic metals.

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This discussion is devoted to zirconium. Actually zirconium is not a new metal. It was discovered in 1789 by Klaproth, who was also the discoverer of titanium and uranium. The extreme difficulty of its extraction and purification delayed the consistent production of zirconium with useful ductility until 1925 when Van Arkel, DeBoer, and Fast developed the iodide crystal bar method of producing metals of nearly absolute purity. Zirconium is not a rare metal. It is, in fact, the ninth most abundant metal in the earth's crust. Zirconium is more plentiful than the familiar metals nickel, copper, zinc and lead. The principal ore is zircon ($ZrSiO_4$) and vast quantities are found on the Florida beaches of this country. The true nature and value of zirconium did not appear until it had been made almost entirely pure. More than a few parts per million of contaminants change it drastically and virtually destroy its value. Almost everything contaminates zirconium, at some temperature. It combines quantitatively at high temperatures with both the oxygen and nitrogen of the atmosphere. Pure zirconium is extremely ductile even to such low temperatures as those associated with liquid nitrogen. It can be forged, rolled, extruded and drawn to a very wide variety of mill products such as billets, bars, strip, sheet, tubing and wire. In nature zirconium always occurs associated with from one to three per cent of hafnium, its chemical homologue, from which it can be separated only by special techniques. The isolation is more difficult than the separation of isotopes of the same element and has been facetiously compared to sorting white eggs from brown eggs in total darkness. One of the outstanding properties of zirconium is its high order of corrosion resistance. Its corrosion properties are enhanced rather than impaired by the presence of the normal hafnium content. Normal zirconium containing hafnium is approximately equivalent to tantalum and the noble metals in resistance to mineral acids and zirconium is more resistant than tantalum to alkalis. It is virtually impervious to fused sodium or potassium hydroxide, fused salts and many low melting liquid metals, such as sodium, potassium, mercury, bismuth and lead. The chief application of zirconium at present is nuclear energy. Low hafnium (reactor quality) zirconium is the only possible core material for the most popular nuclear power reactor type. Zirconium is the only metal with structural strength and adequate corrosion resistance which does not appreciably absorb the slow speed neutrons which are essential to "burning" (fissioning) nuclear fuels, in a thermal or pressurized water reactor such as the propulsion unit for the submarine Nautilus and the W.A.P.D.—Duquesne Light, shippingfort reactor.

Ore Refining Techniques

The winning of zirconium from its abundant ores requires more sophisticated techniques than for common metals. The first high purity zirconium was iodide crystal bar. This process involves decomposition of zirconium tetraiodide vapor (prepared by iodination of crude zirconium) in vacuum tight equipment by a hot filament on which the zirconium crystals (giving the process its name) form. Crystal bar is prohibitively expensive for most purposes. Foote Mineral sold 0.08 (less than a tenth) pound in 1943 at about $630 per pound. By 1948 Foote's production reached the impressive total of 86.5 pounds and was sold at from $135 to $235 per pound. In building the first PWR core this figure shows that the zirconium cost amounted to an amazing 43 per cent of the total.

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The same year the Kroll process (also used for titanium) was initiated at the Northwest Electro Development Laboratories of the U. S. Bureau of Mines at Albany, Oregon, 2150 pounds of sponge metal were produced. In this process zircon is chlorinated in the presence of carbon to form zirconium tetrachloride. This material

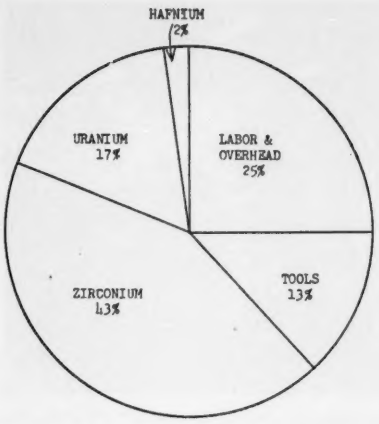

FIG. I

Estimated Cost of Manufacturing First PWR Core

is reduced to zirconium metal by molten magnesium. Zirconium in the form of sponge is separated from the residual magnesium chloride by vacuum distillation. The current production rate is more than 625,000 pounds per year at an average price of $11 per pound.

Availability

Prior to April 1956 zirconium sponge, both commercial (with normal hafnium content) and low hafnium (reactor quality) were available for civilian use. During this period our company purchased sponge, melted ingots and sold mill products in all forms. Since April of this year, title to all zirconium is held by the U. S. A. E. C., including not only all produced in this country, but 200,000 pounds to be imported from Japan. Currently we are melting and converting large quantities of A.E.C. material for A.E.C. and PWR demonstration programs. Several large sponge plants are building and after mid 1957 their output should exceed A.E.C. requirements by at least one million pounds per year. Our firm is increasing melting facilities several fold and contractual arrangements have been made to insure large sponge supplies for melting and fabrication. Thus next year zirconium and its alloys will be commercially available to build industrial power reactors for this and friendly foreign nations. In this way the national and international peaceful uses of the atom will be implemented. Next year when the new sponge plants being constructed begin operation, zirconium will be produced at the rate of more than 3-½ million pounds at possibly less than one-half the present price. This rate of growth is unparalleled in metallurgical history.

Melting

Melting of zirconium sponge to ingots is accomplished by a double electric arc consumable electrode technique in inert atmosphere or high vacuum. Zirconium sponge electrodes 2" square by 20 are compacted in a 1250 ton press. An electrode is formed by heliarc welding a series of the sponge compacts end to end to form a string approximately 15 ft. long to reach from the top of the furnace to the bottom of the crucible. After evacuation and back-filling the furnace with inert gas, an arc is struck between the end of the electrode and a starting charge of zirconium lathe turnings in the bottom of the crucible. The first melt ingot is formed by burn-off of the compacted sponge electrode string by consumable arc melting and progressive solidification in the water cooled copper mold. This has been called the "cold-mold" melting process. Several hundred gallons of cold water per minute circulate through the annulus between the copper crucible and the outer furnace shell. This produces a continually solidifying shell of zirconium in contact with the crucible wall and confines the pool of molten metal directly under the arc to a fraction of the ingot cross section and length at any instant. Consumably melted metal may be said to solidify within a crucible of itself—molten metal never wets the mold wall, and alloying and crucible contamination of the melt are avoided. Since the metal comprising the ingot is never entirely molten (as is the case with conventional melting and casting techniques) segregation does not occur. Ingots are produced without a pipe or shrinkage cavity. The top surface of the ingot is virtually flat. The arc is controlled in such fashion that a "burn-through" of the water jacket is prevented. If water were allowed to contact molten zirconium a serious fire and possibly an explosion or detonation might occur. Arc control and electrode feed are effected remotely by suitable servo mechanisms with no personnel in the furnace area during melting.

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Finely divided zirconium (<20 mesh) is pyrophoric even at room temperature. Coarse particles such

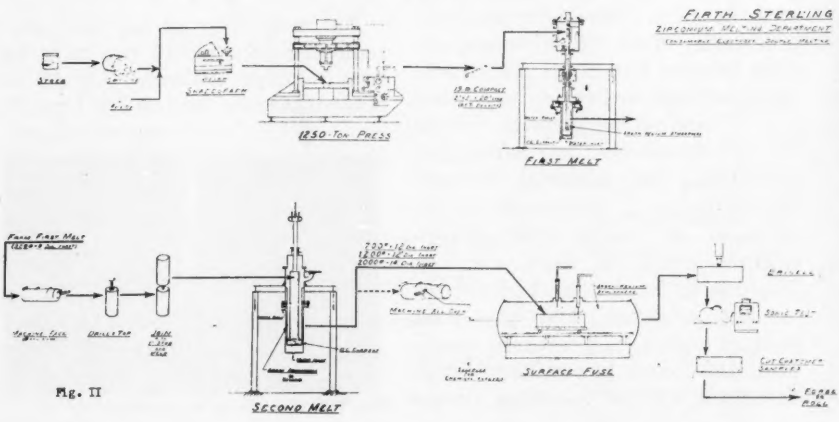

Fig. II

Fig. III. 1250 Ton Press. Zirconium Sponge Electrode Compacting.

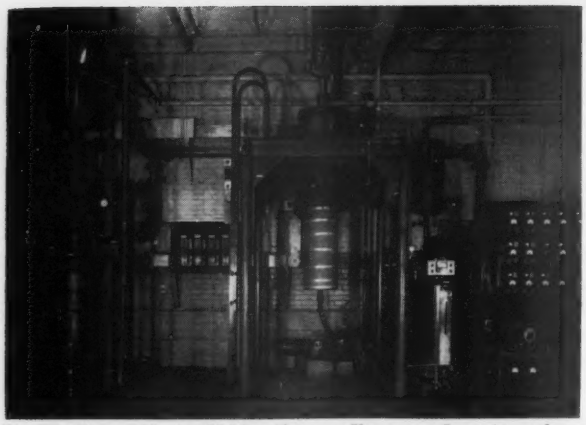

Fig. IV. Consumable Arc Melting Furnaces Vacuum or Inert Atmosphere.

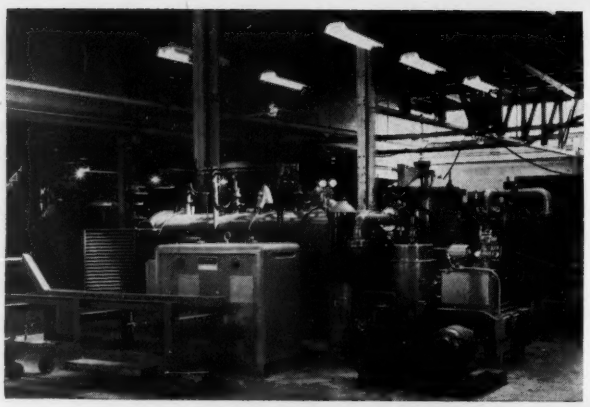

Fig. V. Sidewall Fusion Conditioner. * * * * * * * * * *

as sponge or machined chips can be safely stored dry in metal cans with well fitted covers. Fine particles (<20mesh) should be separated into small lots and burned in the open air.

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First melt ingots approximately 8″ diameter are studded and welded together to form the electrode string for the second melt (either inert atmosphere or vacuum) forming typical ingots which are 12″ diameter by 1000 pounds.

Ingot Conditioning

The surface of consumably melted ingots is deceptively good. Except for minor laps the skin seems quite smooth and solid. The absence of air makes the vacuum melted ingot silvery white. Actually to a depth of perhaps 3/8″ minute subsurface porosity, which would impair forgeability, exists. This skin can be removed by lathe turning—mechanical conditioning.

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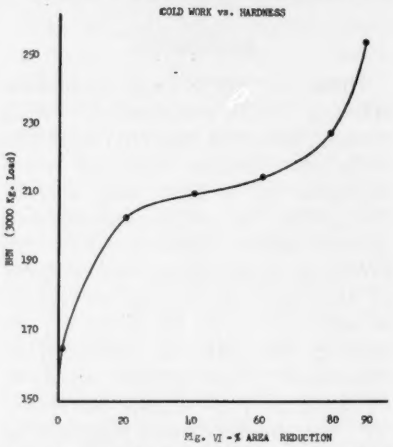
The interior pores may be healed by local remelting using a tungsten welding tip in an inert atmosphere vacuum tight chamber. This device is called an ingot side wall fusion conditioner and is in reality a lathe inside a dry box with the welding tip replacing the cutting tool.

Hot Working

Massive sections such as ingots and billets, including heavy gauge strip, are normally heated in conventional furnaces and air annealed. These products are worked in air. The oxide and nitride films which form are only a few thousandths of an inch thick and are protective. For unalloyed zirconium a typical starting temperature for forging is 1550 F with a finishing temperature of 1200. For rolling the starting temperature is around 1450 and the finishing temperature again 1200 F. For the various zircaloys these temperatures range from 100-300 degrees higher. An exception to this hot working technique is the extrusion process where billets are often heated in a molten salt bath. The adhering salt excludes air and lubricates the work and the die. Even more commonly extrusion billets are jacketed in copper for the same reason and the jacket serves the same function, permitting heating and working in air without serious contamination. The copper jacket can easily be removed in nitric acid, which does not affect the zirconium. Usually when removed the jacket is quite thin and consequently the surface finish on the zirconium product is excellent. Hot working can only be carried to thicknesses on the order of 0.100 thick. Otherwise the contaminating films of oxide and nitride become important percentage wise and further heating will cause the contaminating films to diffuse through the section, hardening and embrittling the material. Oxygen contamination of zirconium can be removed by fusion with molten calcium metal in high vacuum. There is no known method for removing nitrogen, and the final product must not contain more than 100 parts per million. Scale developed by hot working in air must be removed by sand blasting, grinding and pickling in strong hydrofluoric nitric acid solution, removing several thousandths inch from all surfaces.

Cold Working

Zirconium and its alloys strain harden upon cold working and the accompanying figure illustrates the



increase in hardness as a function of cold reduction.

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Normally 8 to 12 per cent area reduction is effected per pass on heavy gauge material. Up to 20 percent may be used on light gauge.

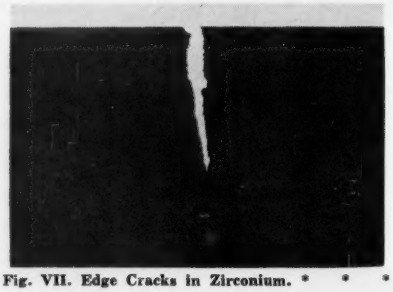

Fig. VII. Edge Cracks in Zirconium. * * *

Vacuum annealing is necessary after approximately 35 per cent total area reduction of heavy gauge zirconium, and for light gauge 60 per cent. Repeated vacuum anneals are necessary to avoid cracking. Standard sheets are hot and cold rolled to 0.012 thick. Strip is hot and cold rolled to 0.005 and foils to less than 0.0005.

Tubing

Seamless tubing is produced by hot extrusion of tube shells which are then tube reduced, cold, and cold drawn over a mandrel in sizes from 2-½" diameter 3/16" wall to less than 3/16" diameter with a 0.010 wall. Tubing may be produced from cold rolled, slit strip by roll forming, heliarc welding (with a trailing gas shield) in air, followed by swedging, tube reducing and redrawing.

Wire

The starting point for cold drawn wire is hot rolled 3/8" diameter rods which are straightened and centerless ground then rolled or cold drawn to less than 0.010" diameter. Tubing and wire present severe difficulties and involve costs in the range of $100 per pound or $10 per foot for tubing and several hundred dollars per pound for fine wire. Being highly reactive zirconium has a severe tendency to seize or gall in dies and on mandrels. Special adherent coatings are necessary plus proper lubrication. Coatings which have been used include phosphates, copper powder with lacquer, rubber base paints, carbonaceous materials with an adhesive binder, and the latest development which is in the nature of a chemical paint which serves the same function as a phosphate coating. Lubricants include Die Gard 84, Master Draw with or without graphite and Mex Mix with Vastolene.

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The physical and mechanical properties of zirconium are shown on the accompanying tables.

Machining

Zirconium and Zircaloy are metals of unusual properties. Being a highly reactive metal, zirconium has a severe tendency to adhere or gall on tools. Although the hardness is deceptively low the metal is definitely abrasive toward cutting tools, probably as a consequence of the tendency of zirconium to alloy readily at the temperatures developed in machining, actually dissolving the tool material. General machining characteristics are between aluminum and titanium.

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Frequently hot worked zirconium and zircaloy may have a tightly adherent encrustation or scale of zirconium oxide and zirconium nitride, both of which are highly abrasive. Zirconium has a definite tendency toward strain hardening during cold work, such as machining. Both the metal and its alloys have relatively high yield strength but low modulus of elasticity, and this accounts for the tendency to deflect during machining. Finally, the metal in finely divided form is highly pyrophoric and presents a serious fire hazard. Avoid shallow cuts and fine feeds except at very slow speeds.

These materials may be machined with standard cutters designed for aluminum, having perhaps 10 to 12 degree rake and 5 degree primary relief. In face mills of normal diameter from 8 to 10 inserted teeth are commonly used. Slab mills should have a minimum of 25 degree helix in addition to the rake previously mentioned. Four inch wide cutters are made with solid Firthite helical inserts. The flutes or chip sliding surfaces of all tools and cutters should be polished and frequent honing should be done to prevent the retention of a build-up edge. The cutters should be changed for sharpening at the first indication of any cutting edge failure either through wear or chipping, otherwise an extremely rough surface will result and the fire hazard will be greatly increased. Avoid shallow cuts and fine feeds except at low speeds.

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Although high speed steel tools and cutters can be used, it is recommended that a wear resistant sintered carbide such as Firthite grade HA should be used for most production work. For heavy roughing Grade TO4 is recommended. The cutting fluid should be a light mineral oil with a high flash point, such as Blandol. These materials can be machined over a wide range of depth of cut, feed and speed. For example, a 5" diameter cutter with six teeth, operating at 168 surface feet per minute and 6⅛" per minute feed, will produce a 60 microinch surface finish. Feeds up to 15" per minute with a 12" diameter face mill will produce even

(*Please turn to page* 1506)

Table I

PHYSICAL PROPERTIES OF ZIRCONIUM

Specific Gravity	6.5
Density (lbs. per cu.in.)	0.235
Melting point	~ 3350°F
Specific heat	~ 0.066 cal. g^{-1} $^{o}C^{-1}$ @ 25°C
Lin. coeff. th. exp.	~ 6 x 10^{-6} cm. $cm.^{-1}$ $^{o}C^{-1}$
Thermal conductivity	~ 0.04 cal cm^{-2} cm^{-1} $^{o}C^{-1}$ sec^{-1}
Crystal structure	α (< 863°C) HCP , β (> 863°C) BCC
Electrical Resistivity	~40 microhm cms. @ 20°C

Table II

MECHANICAL PROPERTIES OF ZIRCONIUM

Ultimate Tensile Strength (lbs. $in.^{-2}$ x 10^{3})		HARDNESS BHN	HARDNESS R_B
Ingot	70 - 86	150 - 173	80 - 87
Hot rolled	86 - 112	174 - 207	87 - 94
Air Annealed	70 - 100	163 - 187	84 - 90
Strip, Wire			
Cold rolled	115 - 125	229 - 255	98 - 102
Vac. annealed	75 - 90	157 - 179	82 - 88
Modulus of Elasticity	12.8 x 10^{6} lbs. $in.^{-2}$		
Charpy Impact Strength	15 ft. lbs.		

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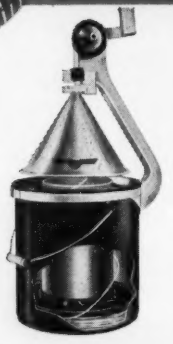

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SALES OFFICES IN ALL PRINCIPAL CITIES

Polyethylene Insulated High Voltage Power Cable

by Victor Siegfried, Chief Engineer
The Ansonia Wire and Cable Company
Ashton, Rhode Island

The use of polyethylene as electrical insulation is becoming quite widespread for many applications where its dielectric properties are well utilized.[1] In signal and communication circuits, it is especially useful from the standpoint of low-loss transmission, and many other applications derive benefit from properties stemming from polyethylene's low dielectric constant and low-loss factor. Power cable applications are quite common up to 5KV; airport and street lighting cable up to 10KV, neon sign and ignition cable up to 15KV, and a limited use up to 15KV for power cable is being realized.

★ ★ ★

In some power applications, polyethylene is of interest because of its resistance to chemical attack, as in oil refineries and chemical plants.[2] In others, the low value of charging current, attributable to low SIC or dielectric constant, gives this type of cable certain advantages over other traditional insulations. The extension of the range of usefulness is progressing with the advent of a choice of types of polyethylene which give intriguing properties from which to select the most significant. Unfortunately, not all the good ones are in the same package.

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Polyethylene, generally used as electrical insulation, is the high-pressure-produced polymer with very good dielectric but only moderate physical properties. New low-pressure polymers have improved physical characteristics and retain most of the good dielectric properties, to the extent that they offer a new range of applications. Higher toughness, or modulus, is one desirable improvement which overcomes some of the deficiencies accepted in earlier compromises to achieve the original benefits due to the dielectric. It would appear that we are on the threshold of obtaining a reasonable blending of characteristics which can be tailored to specific needs. Considerable development work by raw material suppliers is already under way, which will be matched by that of fabricators and users of cable in the immediate future.

Victor Siegfried

The author is a graduate of Stanford University with A.B. and Engineer Degrees. From 1933 to 1944, he was Instructor and Assistant Professor of Electrical Engineering at Worcester Polytechnic Institute. In 1944, he joined American Steel and Wire's Electric Cable Works as Chief Research Engineer and was in charge of research and development until January 1956. In February, 1956, he became Power Cable Engineer of Ansonia Wire and Cable Company in Ansonia, Conn. In June 1956, he was named Chief Engineer. He is a member of AIEE, of which he has been a Vice President and a Director.
Mr. Siegfried presented this paper at the Annual Convention of the Wire Association in Pittsburgh on October 30, 1956.

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The principal object of this paper is to report an evaluation being made with one of the new polymers, Marlex 50 produced by Phillips Petroleum Company.[3] A pilot run of power cable to operate on a 5KV system was produced with one lot of Marlex 50, and the experience in this venture is felt to be worthy of presentation, even though actual test data are yet relatively meager.

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For this evaluation, a 3-conductor 5000 Volt aerial cable application was selected with the following construction:

350 MCM 37 wire aluminum strand.
Strand shielding.
Marlex 50 Polyethylene - 8/64 inch.
Bedding tape.
Copper shielding tape.
Polyvinyl Chloride jacket.
3 conductors cabled and lashed to messenger.

★ ★ ★

A conventional extrusion of the Marlex was employed in an electrically heated extruder, with care taken to eliminate pull-down of the Marlex 50. The cooling trough was equipped with steam coils in the forward zones to permit 180°F temperature at the entrance, and cold water near the capstan box. Extrusion temperature was 420°F, as measured, which is approximately 40° hotter than for high-pressure polyethylene. The importance of graduated cooling for proper crystallization of the long chain polymer is even more greatly emphasized for this type of material than for other polyethylenes.

★ ★ ★

During extrusion of the Marlex 50 insulation, the initial temperature of the cooling water was so near its boiling point that the heat from the Marlex 50 initiated local

steam bubbles which attached themselves to the surface. It was soon noted that these caused craters on the surface, so a cold water hose was introduced just behind the entering dam to quench the surface in a very short zone, following which the above hot water graduations took over for the "annealing" process. One suggestion borrowed from the plastic pipe process might be to use a long land die extending beyond the tuber into a water-or-air-cooled sizing box to achieve this skin-hardening, before entering the annealing zone of graduated cooling.

★ ★ ★

Evaluation of the cable of interest at this time concerns corona protection and heat-shock resistance. Corona extinction showed 8000 Volts, which is very high for this rating of cable, and indicated good performance of shielding layers. Oven testing at 121°C showed that a bend around a 4 inch diameter mandrel was required to initiate heat cracks in open air. In Igepal, environmental stress cracking was initiated at 50°C for a 2 inch U-bend in 8 hours.

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Elongation of molded samples of the polymer, as measured at the standard pullout of 20 inches per minute, showed failure at 25% elongation. However, at 2 inches per minute, elongation was 800%. These data confirm properties expected from Marlex 50,[4] and also reopen the question of the validity of high pull-out speeds for such testing. Consideration should be given to establishing test methods or requirements to permit a more reasonable evaluation that does not mitigate against new materials. Functional tests show adequacy of the material in service, so specification testing should be brought into conformity and remove restrictions that bias the results.

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On the high voltage accelerated test, the cable withstood 17KV for approximately 8 hours. As this was double the corona voltage, there was undoubtedly violent ionization of any void in the cable structure. In fact, examination of this test core shows lateral surface erosion at lapped spots under the shielding tape, which is confirming evidence of corona action. However, the failure was not at one of these. At a lower voltage of 15.5KV, 448 hours under test were required to break down a second sample.

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Installation of this cable was arranged to keep bends as long as possible. Conduit entrances were swept to a 24 inch radius, (Fig. 1) and cubicles were arranged to require only a very long-radius curve. Terminations were made with generous stress cones and full care taken to eliminate corona voids in the cable ends. (Fig. 2)

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All exposed ends were taped to exclude light on unprotected insulation. Termination at the transformer yard from the aerial cable was made from above the switches, so no drip loop was needed. Cone length was 7 to 12 inches, although, at this voltage, 4 to 6 inches would have been sufficient.

★ ★ ★

To conclude this description of a cable using a worthy new material, some thought must be given to

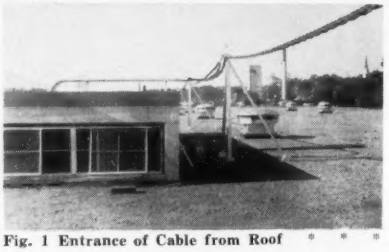

Fig. 1 Entrance of Cable from Roof

opening specifications to allow low-pressure polymers of this and other types, on the basis of performance rather than present material requirements. In the hope of expediting this acceptance, this first evaluation project was undertaken. Extension to higher voltages and to other sizes remains for future work, but sufficient experience has already been had to make it attractive. Development work on some of the manufacturing problems touched on above, and further experience and test data are being obtained.

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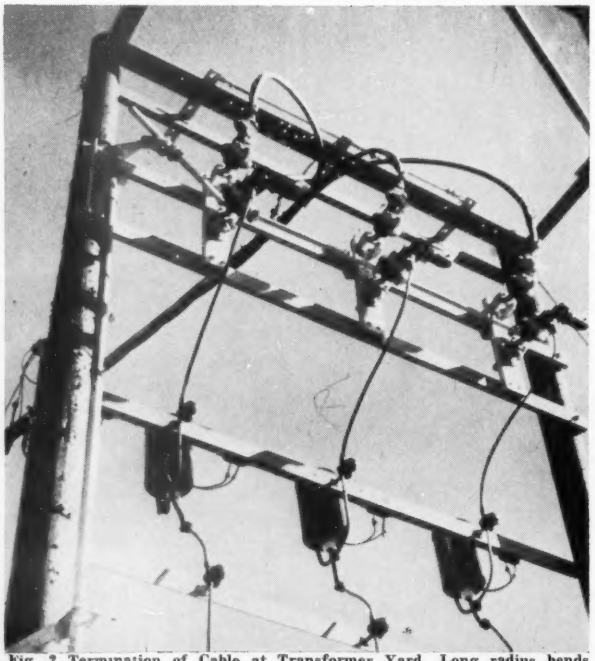

Fig. 2 Termination of Cable at Transformer Yard. Long radius bends provided

The Control of Insulated Wire Diameter

by

Charles M. Fredrickson
Assistant Production Superintendent
Kaiser Aluminum and Chemical Corporation
Newark, Ohio

and

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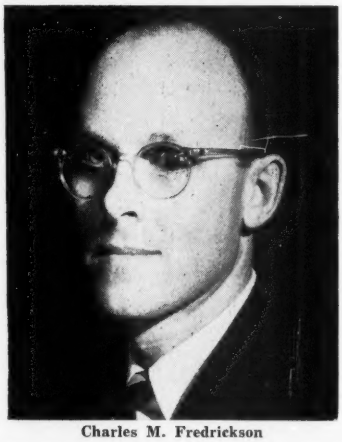
Industrial Gauges Corporation
Englewood, New Jersey



Charles M. Fredrickson

This paper was presented by Mr. Fredrickson at the Annual Convention of The Wire Association at Pittsburgh, Pa., on October 30, 1956. In it the authors give the results of tests made on automatic diameter control devices and outline the benefits to be derived from them.

Mr. Fredrickson joined Kaiser in 1950 and has held various production and technical positions at the Newark Works, presently being in charge of covered electrical conductor products. Prior to his Kaiser affiliation he worked for General Cable Corporation in St. Louis as Chief Chemist and Rubber Mill Superintendent. He attended the Universities of Kansas and Columbia.

As Sales Manager for his Company Mr. Gibbs has been working for the last six years on the non-contact method of controlling and measuring wire for out of roundness. He delivered a paper last year on the electronic measurement of wire rod diameters and its place in automation.

Charles D. Gibbs

Generally speaking, since World War II business has enjoyed the benefits of a healthy, rapidly expanding economy. The unparalleled national prosperity, coupled with the American public's desire for an ever higher standard of living, has given impetus to the manufacturer to improve and enlarge his existing facilities. It is predicted that by the year 1965, the producers of electrical power will have more than doubled their entire output recorded last year.[1] Due to the tremendous use of electricity in today's economy, the wire and cable industry has conducted a program of systematic expansion in order to satisfy the demands of the market. Higher and higher production schedules have been accepted as common by the industry as it strives to increase the "tonnage shipped" figure. However, these increases cannot be met entirely by capital outlays for twice the present manufacturing capacity. They must be met, to a large extent, by optimum utilization of existing equipment, increased labor efficiency, and reduced waste.

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Naturally, these increases in production cannot be purchased at the cost of sacrificing standards of quality. The manufacturer of covered conductor must do more than match his competitors on a volume basis. He must also make certain that his products are of such quality that they will meet or surpass the specifications set forth by such organizations as the Insulated Power Cable Engineers Association, the American Standards Association, Underwriters' Laboratories, and other agencies whose job is to protect the consumer. This does not include the specifications set by the manufacturer himself on his own products. These specifications often are much tighter than those necessary to merely market the product. All specifications are becoming increasingly stringent as the users of covered conductor become more demanding and less tolerant of marginal standards of quality. For example, one of our customers, a major sized electrical utility, has reduced the cover thickness required on their products to values below those presently accepted by industry specifications, with corresponding economic advantages.

Practically all types of manufacturing require the use of electricity. As the production process becomes more exact and complex, it is only natural that the wire and cable be forced to meet tighter specifications.

★ ★ ★

All of this has meant that many technological developments have had to be introduced to aid the manufacturer in raising his production without loss of quality. One of the more recent terms added to manufacturing jargon is the word "automation." The use of automatic controls is becoming more prevalent as industry seeks methods of increasing production while effectively controlling and improving the quality of their product.

★ ★ ★

Automatic controls have found a place in the electric wire and cable industry. Barrel temperature control and screw and capstan speed control are two examples. These can be traced back to relatively crude devices which have been greatly improved during the course of the years and which will continue to be improved in the future. In the same category, auto-

[1] Source "Electric Light and Power," June, 1956.

matic diameter control has evolved from a simple device to a complex precision instrument.

★ ★ ★

We, at Kaiser Aluminum, have installed automatic diameter control on plastic tubing equipment in order to increase production and minimize the problem of fluctuating over-all diameters of covered conductors. Purchase of this control was not based on a "spur of the moment" decision. Sometimes, we may postpone the installation of a control system because it is felt there will be a better method available in two or three more years. Procrastination is easy, and it may avert many costly miscalculations. Certainly, there will be better controls in the future, for present day techniques are not 100% effective. However, we believe that after studying both the advantages and limitations, it can be shown that automatic controls on a tuber can be effectively utilized at this stage of their evolution.

★ ★ ★

In order to perform its task, the automatic control must perform two major functions—measurement and control. Measurement consists of detecting variations in wire diameter and converting them into an analog value. The control then adjusts capstan speed by means of a motor driven rheostat whenever deviations in diameter exceed the pre-set limits. Pull-out speed varies while stock-screw revolutions per unit time remain at a constant level. The tuber is thus regulated so that it will hold the covered conductor as close as possible to the required over-all diameter.

★ ★ ★

This detection of deviations or measurement is accomplished with a photo-electric gauge.

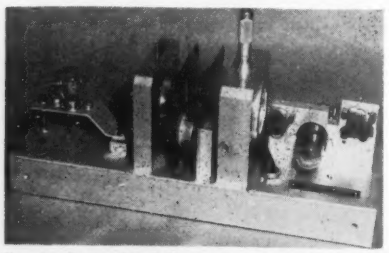


Fig. 1—Gauge Head Exposed.

The gauge head contains a light source, lens system, guide pulleys, light defining apertures for the measuring beam and reference beam, a measuring phototube, and a reference phototube. In use, the wire being produced is suspended in the measuring beam with some light passing over and under. A fixed amount of light reaches the reference phototube at all times. Imbalance of the signals generated in the measuring phototube and reference phototube are amplified on a zero-center meter calibrated directly in thousandths of an inch. So long as the wire does not whip out of the measuring beam, the gauge reading will be true.

★ ★ ★

The gauge head should be considered a precision instrument and should be amply protected.

★ ★ ★

Kaiser has installed the gauge head at the exit end of the water trough, preceded by an air wipe which removes water from the wire. This is necessary to protect the internal mechanism of the gauge head from water damage. The location of the gauge head is a compromise, since it is highly desirable to detect and correct deviations as close to the extruder as possible. However, in addition to the practical considerations of moisture, the location of the gauge head provides a direct indication of the cold diameter, after shrinkage has been essentially completed. In cases where stretching occurs between the capstan and take-up, either accidentally or by design, the gauge head should be located as near the take-up as is possible. The gauge head is installed with a safety device which drops the head should the diameter of the covered conductor become too large to pass through the slot in the cover. For convenience, the measuring console is located adjacent to the gauge head. Its deviation indicator meter permits the operator to monitor diameter while working in the capstan area.

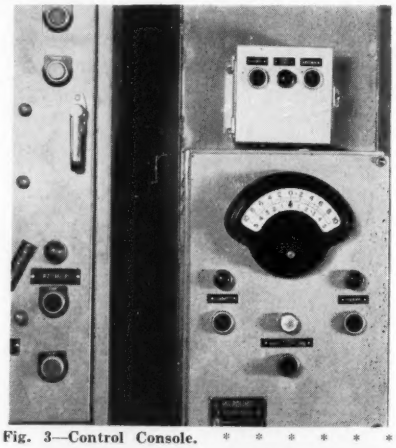
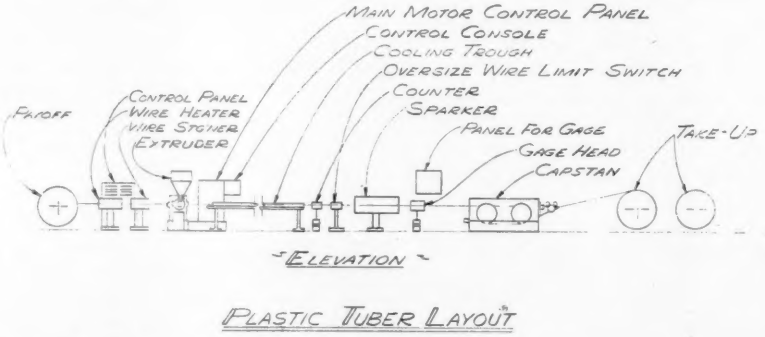


Fig. 3—Control Console.

The control console is located adjacent to the tuber control panel and mounts a second deviation indicator meter. The limit setting, correction time, proportioning and transit time controls are located within this cabinet, accessible to the operator for setting.

★ ★ ★

The control console includes a system of circuitry relays and timers to permit setting the point at which corrections will occur, the basic amount of correction, the intervals between corrections, and the ratio between error and correction, or proportion. The output of the control console drives a motorized rheostat in the capstan speed circuit to adjust pull-out. The use of this proportional, incremental system of correction permits ad-



PLASTIC TUBER LAYOUT

Fig. 2—Schematic Layout of Tuber.

justment to wire diameter as quickly as is possible without overshooting or hunting.

★ ★ ★

Education of the operator is a vital factor in assuring the success of the automatic control. He must be familiarized with the capabilities and limitations of automatic diameter control. With this information, he can operate the tuber and control in concurrence with one another. The control enables the operator to make sensitive adjustments to balance the tuber since the meter indicator gives instant notice if the over-all diameter is not holding satisfactorily.

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Obviously, there are many advantages in maintaining a constant over-all diameter on the covered conductor as it is being extruded.

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Every extruder produces covered conductor which does not have an absolutely uniform over-all diameter. This nonuniformity is traceable to equipment limitations or operating techniques.

★ ★ ★

There may be inherent characteristics of the tuber which will cause the over-all diameter to fluctuate. Certain of these can be called short-term cycles since they are completed during the time it takes for a theoretical point on the covered conductor to travel from the extruder head to the gauge head. Cycles which are not completed during this interval are called long-term cycles. These cycles, along with gradual tuber drift, can be effectively suppressed by the automatic control.

★ ★ ★

When the plastic tuber is run on manual operation, the only method the operator can use to check the over-all diameter is an occasional measurement with a hand micrometer. These measurements are taken rather infrequently after the operator has obtained concentricity of covering and reached the required over-all diameter. This makes it difficult for him to ascertain cyclic variations in the size of the diameter, particularly if these cycles are of long duration. To guard against these variations, the operator may run the covered conductor toward the maximum end of the diameter tolerance range. In this way, he hopes to prevent the over-all diameter from dipping below minimum.

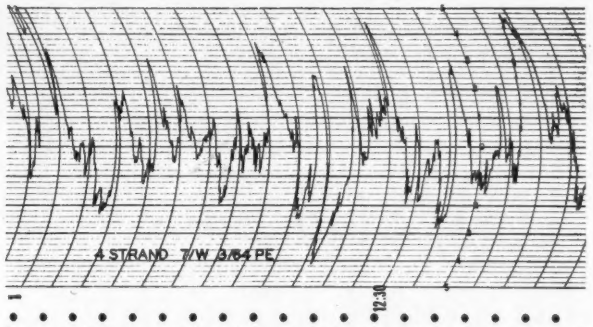

Figure 4—Recording of typical uncorrected tuber output. * * * *

★ ★ ★

This is a costly practice, since it consumes an excessive amount of plastic covering material. Through use of the automatic control, the "peaks" and "valleys" of the over-all diameter can be evened out, enabling the operator to produce covered conductor well within the diameter tolerances indicated in the standard operating procedure. Because less scrap is generated, and less plastic is consumed, production costs decrease.

★ ★ ★

It should be remembered that the automatic diameter control will not compensate for all fluctuations of the over-all diameter caused by malfunctioning components of the tuber.

★ ★ ★

As such, one of the first uses of the control unit is in evaluating the tuber's components. A great deal can be learned about the peculiarities of an extruder or operating technique through use of the control. Further, since the automatic control should not respond to high frequency, self-correcting cycles in wire diameter variations, working on the drift only, it is desirable to reduce the high frequency cycles to the practical minimum before applying the principle of automatic diameter control. Self-correcting cycles arise out of many factors which can be reduced to two classes: equipment faults and improper techniques. They include such things as:

1. **Uneven payoff tension**
2. **Improper heats**
3. **Poor cooling of the stockscrew**
4. **A warped stockscrew**
5. **Whipping of the wire in the water trough**
6. **Slippage of the capstan**
7. **Erratic take-up tension**
8. **Malfunction of the take-up traverse**

(*Please turn to page* 1494)

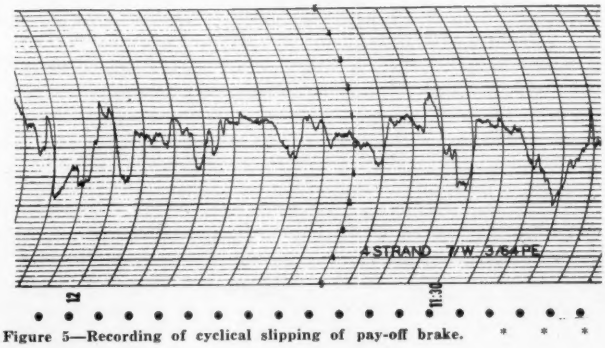

Figure 5—Recording of cyclical slipping of pay-off brake. * * *

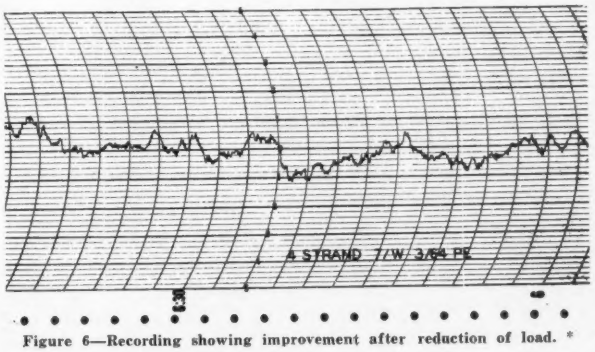

Figure 6—Recording showing improvement after reduction of load. * *

Story of a man who spent all night in the kitchen

(or why use ELGIN Diamond)

Henry was on cloud seven the night of the party. For weeks he'd planned and prepared, checked and double checked. Nothing would go wrong . . . not with old Henry at the helm. And sheer genius, Henry, inviting the boss. Now you're sure to get the raise . . . maybe even a promotion. When the first guests began to arrive, it started . . . Henry mixing drinks, that is. Henry mixed and served — served and mixed and then mixed some more. Afterwards — everyone said they had a perfectly marvelous time, but, wasn't it too bad that poor Henry had to spend so much time mixing things. Ah, yes — poor Henry spent all night in the kitchen . . . mixing . . . missed his own party.

Henry has another party coming up real soon and things are going to be different. You see, Henry's boss told him about ready-mixed drinks. They're much more convenient, save you time and cost less, too. The boss also explained that now-a-days lots of things are ready-mixed. Take for example, the Elgin Diamond they used at the plant for polishing.

"Right", said Henry — grabbing the ball and running with it. "With Elgin Diamond, there's no troublesome mixing or special grading, no expensive waste or chance for error. And our polishing results are consistent, too, because Elgin diamond particles are permanently suspended in a specially formulated, color-identified vehicle. "Bully, Henry, bully", cried the boss.

If your company doesn't now use Elgin Diamond, why not slip your boss the word? Good things always seem to happen when you use Elgin Diamond.

ABRASIVES **DIVISION**

Dept. G

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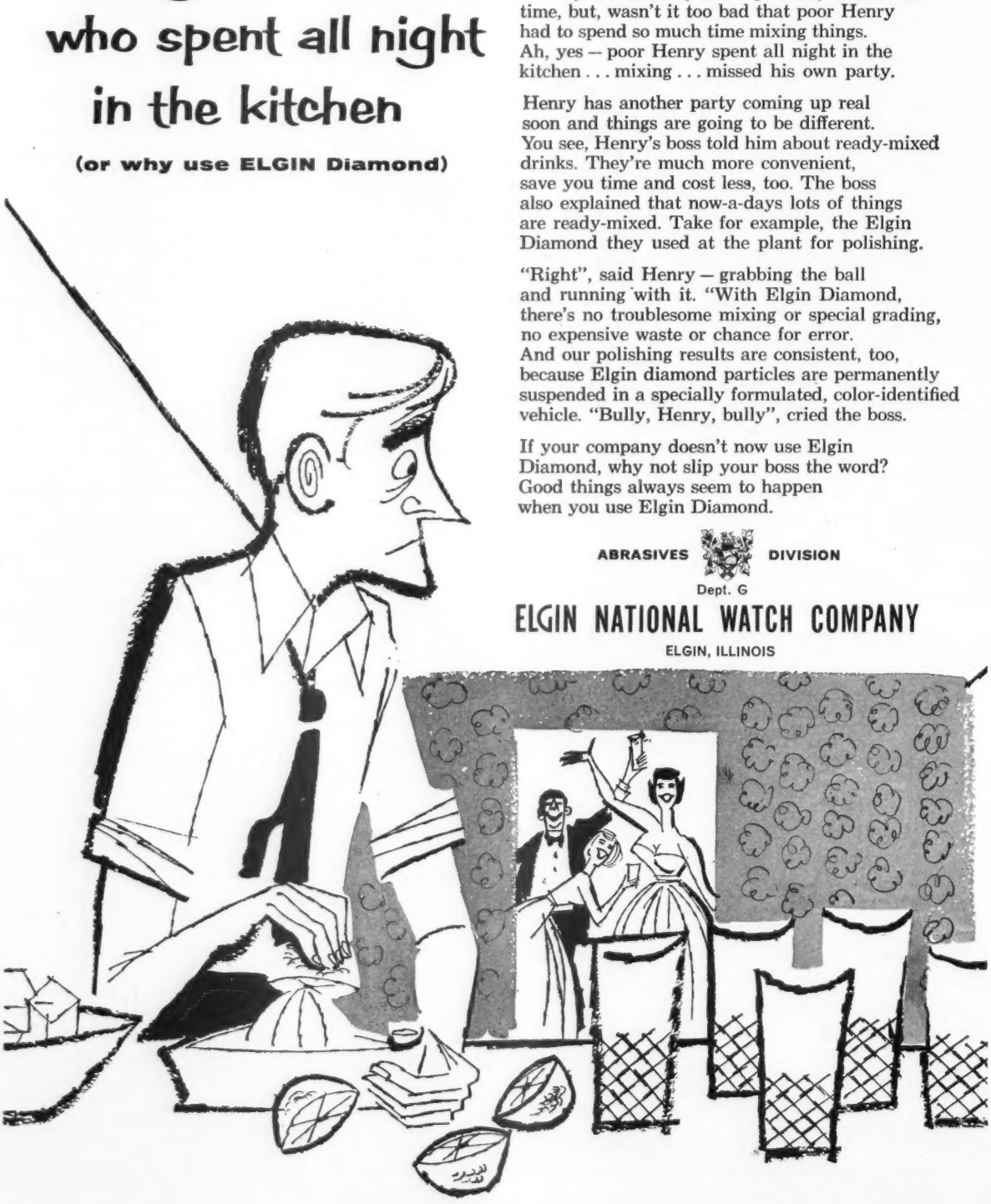
ELGIN, ILLINOIS



Draw-Pak

by Joseph J. Kovaleski
Sales and Application Manager
The Coulter & McKenzie Machine Company
Bridgeport, Connecticut

This paper was delivered before the Joint Technical Session of the Ferrous and Non-Ferrous Divisions of The Wire Association at the Annual Convention in Pittsburgh, Pa., on October 29, 1956.

In it the author describes the four capstan positions and the applications for which each is suited.

Draw-Pak was originated to draw or take up wire, particularly the finer sizes, in the heaviest possible coils. The package was to be limited in weight only by practical material handling and shipping facilities.

★ ★ ★

The containers or adapters used would serve as dispensers for the wire thus packaged.

★ ★ ★

Applications by both the wire manufacturer and wire consumer brought about many mechanical changes and improvements in a relatively short span of time. The improvements are indicative that Draw-Pak is another step in the wire industry's search for "continuous processing," which latterly the automotive industry termed "automation."

★ ★ ★

The intent of this paper is to review the mechanical progress to date with particular emphasis on the positions of the drawing block or processing Capstan relative to the accumulating container or adapter.

Currently, wires from ¼" to .010", both ferrous and non-ferrous, are commercially produced in pails, drums or adapters in weights from 30 to 1000 lbs. Materials from soft copper and zinc to high carbon steel and its alloys are drawpackaged at speeds up to 1200 feet per minute.

★ ★ ★

The first and perhaps the most important factor of good packaging and payout, is the cast of the wire. This is not only true of Draw-Pak but of any coil of wire that is to be flipped from a stationary position. The effects of bad cast are immediately reflected in a bad package which cannot be tied with band wire.

★ ★ ★

The surface condition of any wire has a definite effect on the weight of a coil. This condition in a like manner is reflected in drawpackaging. It is thus reasonable to assume that the better lubricated surfaces will pack the heaviest at a given speed.

★ ★ ★

Bare coils are subject to abuse when handled. Mill payout characteristics are frequently lost by the time the coils reach their point of end use. Payout is less faulty when the coil remains at rest in or on the original accumulating mechanism designed to accept and correct the gyrations and centrifugal forces imposed on the coil during manufacture.

★ ★ ★

Four basic mechanical arrangements of the Block or Capstan are used. Each arrangement performs the function for which it was designed. The variety of wires being processed and a desire for flexibility dictate the proper application of each arrangement. Bear in mind also that in the Draw-Pak process, major consideration is given to the removal of the wire from the container in a stationary position as this is one of the foremost advantages of the package.

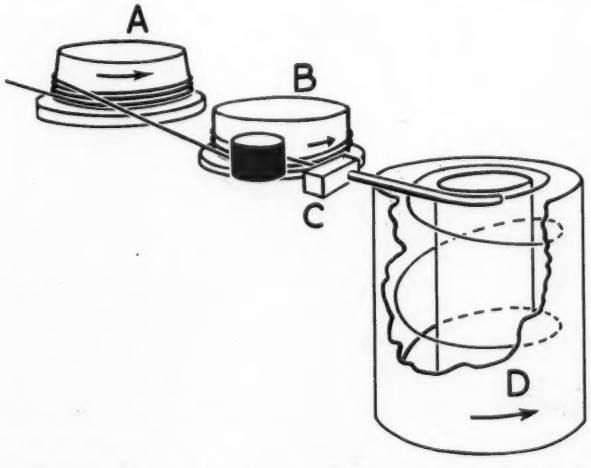


Figure 1

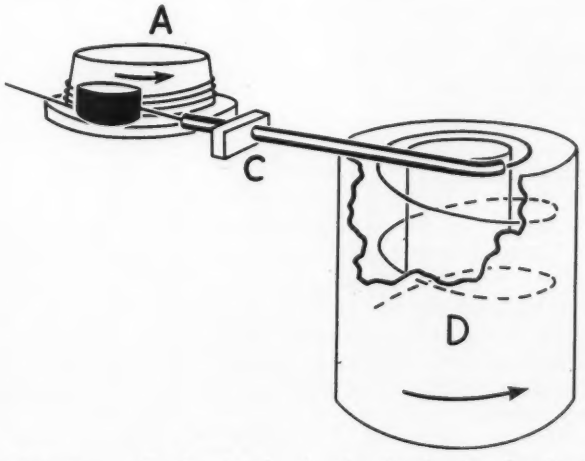


Figure 2

Here in Figure #1, we have the Capstan "B" in the Vertical Position, the wire being snubbed and pushed by the Pressure Roll through the Guide Device "C" into the container "D". This position of the Capstan is readily adaptable to existing wire drawing or takeup equipment "A." Assuming "A" is a 12″ Block and "B" a 16″ Block, the combination will produce 12″ coils, 16″ coils or drumpackages, increasing the flexibility of equipment "A" with no mechanical set-up time.

★ ★ ★

Figure #2 illustrates the Vertical Position with closer coupling of the Attachment but less flexibility. The Pressure Roll and Guide Assembly 'c' can be mounted on Block "A" of the original equipment.

★ ★ ★

The vertical capstan positions shown in Figures #1 & #2 operate well at speeds up to 1200 feet per minute. When wire sizes in excess of .100 are being processed utilizing the vertical Capstan position, the Guide has a tendency to alter the lay or helix of the cast which in turn affects the loaded weight of the drum. This cast distortion varies with wire sizes and tempers necessitating mechanical adjustments at the point of cast control.

★ ★ ★

The container or adapter may be removed utilizing either overhead or side material handling equipment.

★ ★ ★

Figure #3 depicts the Capstan "A" in the Horizontal "S" Position where the pulling surface of the Capstan is directly over the annular loading space "S" between the inner wall of the drum and the outer wall of the core. If the Capstan rotates in a clockwise direction, the drum must rotate counterclockwise, the wire leaving the bottom of the Capstan and entering the container approximates an "S" pattern. This Capstan arrangement permits the compactness necessary for multiple head takeups. Elimination of a Guide permits drum removal and string-up at slow speeds.

★ ★ ★

The Horizontal "C" Position of

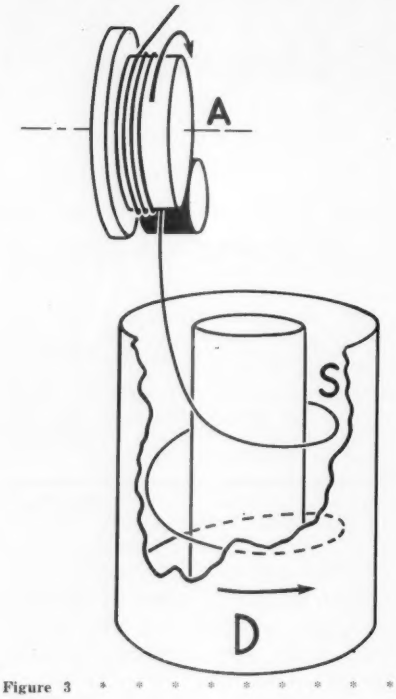


Figure 3

Figure #4 depicts the Capstan "A" set directly behind the Drum "D" with approximately 50% of its

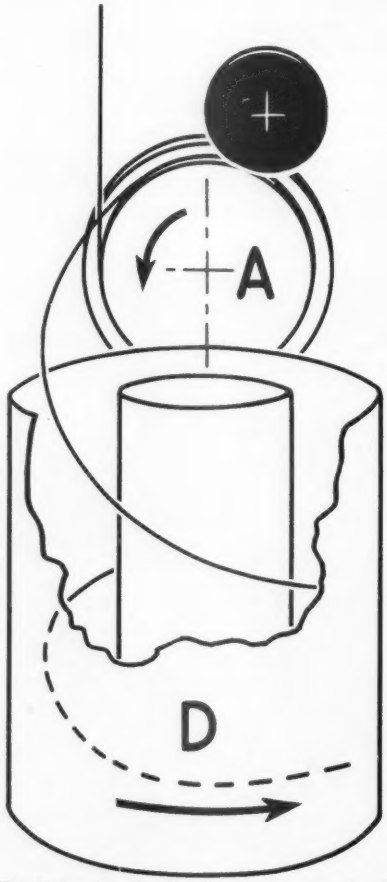


Figure 4

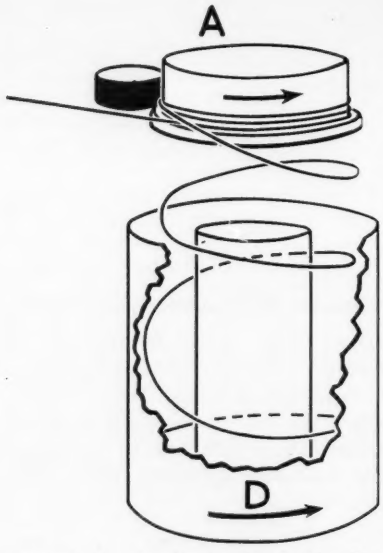


Figure 5

diameter protruding above the top of the container. The Capstan and Drum rotate in the same direction and the wire is directed from the top of the Capstan to the drum in the form of a "C". The top of the container or adapter is exposed for convenient overhead or side type material handling. Again, with the absence of a Guide, string-up and unloading is accomplished while in motion.

★ ★ ★

This position is perhaps the most flexible for takeups and offers no reasonable limitations in the sizes of containers or adapters used.

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The Overhead Position in Figure #5 with Capstan "A" directly over container "D" allows the wire to flow downward in a helix simulat-

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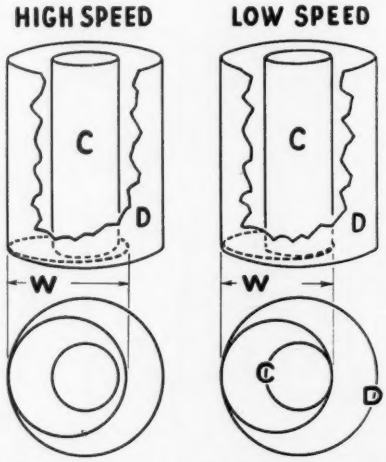
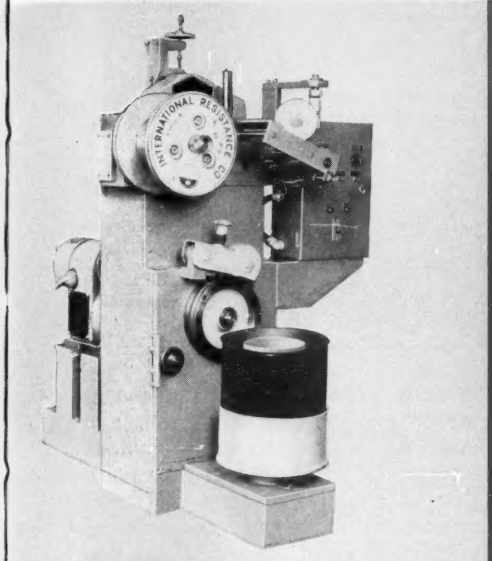


Figure 6

COULTER & McKENZIE

CONSTANT TENSION DRAW-PAK EQUIPMENT

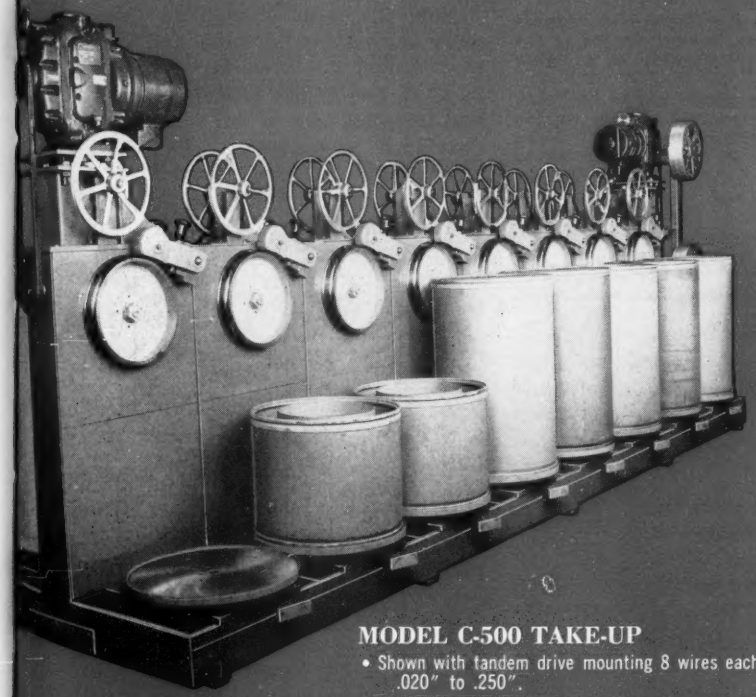
FOR CONTINUOUS WIRE PACKING & DRAWING



- Combination drum or spool take-up and rewinder.
- Shown for single wire.
- Adjustable for tension, pitch and amplitude of traverse.
- 12" spool shown. 30 to 150 lb. drums.

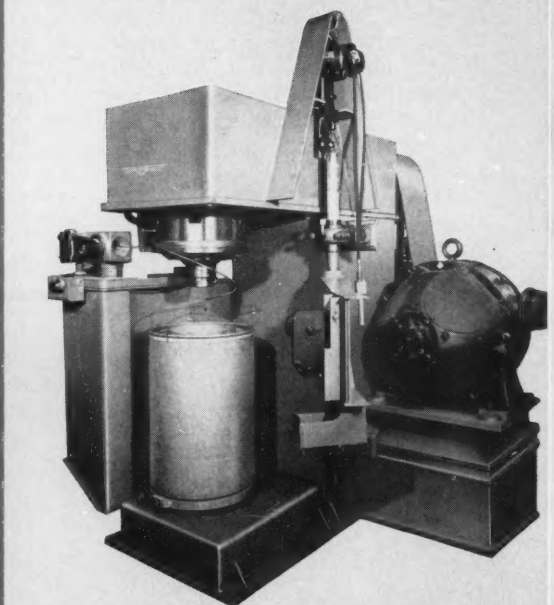
MODEL C-100 TAKE-UP

- Shown with single drive mounting to 16 wires .008" to .051"
- Enameling, annealing, galvanizing, tinning, etc.
- Containers 30 to 150 lbs.



MODEL C-500 TAKE-UP

- Shown with tandem drive mounting 8 wires each side .020" to .250".
- Galvanizing, patenting, enameling, etc.
- Drum or adapter weights 200 to 1,000 lbs.



MODEL 138-A DRAW BLOCK

- Single draft wires .016" to .375"
- "Draw-cast" die box shown gives adjustable positive cast control. Also available in other sizes.
- Process adapters to order — drums to 1,000 lbs.

inquiry specifying the application which is of interest ou will result in prompt and courteous attention.

Pat. No. 2,732,060. Other U. S. and foreign patents pending.

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SINCE 1843 BRIDGEPORT 3, CONNECTICUT, U. S. A. INCORPORATED 1881

Automatic Coil Strapping

by Joseph F. Beckman
Assistant Director of Sales and Manager of Steel Sales
Signode Steel Strapping Company
Chicago, Illinois

Mr. Chairman, members and guests of the Wire Convention, it is a real pleasure to be asked to speak before this group and to present to you in the brief time allotted to me, the background on what has been done and what we hope to do in the field of automatic coil strapping.

★ ★ ★

Let's go back about 15 years and see what was being done about coil strapping at that time. The job was being done with hand tools which had seemed sufficient up to that point. But, under the impact of war and the resulting speed-up in production and the manpower shortage, the mills were demanding automatic strapping equipment. In 1941 we developed the first Power Strapping Machine and used it in our own plant for several years tying coils of Signode steel strapping. During this time, our engineers were constantly changing and improving the design of the machine so that it operated reliably in continuous use on the production line. In 1944 we felt that we finally had a machine which could safely be released to the field. Our first production machine was placed in a large copper manufacturing plant. It was used for strapping wooden boxes containing long sections of copper tubing. This machine was what we call semi-automatic in that it is necessary for the operator to control the feed of the strapping by hand.

★ ★ ★

Naturally, the steel industry wanted equipment of this kind and in 1946 we placed our first Power Strapping Machine in a steel wire mill. This was also a semi-automatic machine, but it represented a tremendous improvement over anything that had been developed for this application up to that time.

Joseph F. Beckman

This paper was prepared for presentation at the Annual Convention of the Wire Association in Pittsburgh on October 31, 1956.

Mr. Beckman has been with Signode for over 31 years, having started in the Philadelphia office working as a Junior Salesman.

Later, he was transferred to Portland, Maine, where he covered a great portion of the New England states as a Sales Representative. He was transferred to Los Angeles, California, as District Sales Manager and later to New Orleans, Louisiana, as District Sales Manager, before coming to Chicago to serve in the capacity he now holds.

★ ★ ★

During the next three years we installed a number of semi-automatic machines of this sort, not only for tying small lightweight coils of wire, but also small strip coils.

★ ★ ★

Now that we had demonstrated that we could successfully handle the smaller and lighter coils on power strapping machines, the demand grew for larger and more automatic equipment to handle heavier coils. In 1949 we placed our first Heavy Duty Power Strapping Machine in a large wire mill. This machine could handle coils weighing from 600 pounds to 800 pounds. An overhead tramrail was used for handling the coils into and out of the machine. It took quite a bit of space and the operator still had to index the coils manually to apply the various straps. Several more of these machines were placed during the year 1950 and proved to be a real boon to the wire mills in getting out their production.

★ ★ ★

Now the mills wanted an even more automatic machine and one that would tie even larger coils. In 1952, one of our customers who had installed one of our machines, developed a conveyor which enabled them to tie coils from 22″ to 60″ in diameter right on the conveyor. The conveyor rollers were so arranged that the large coils could be turned by hand so that the required number of straps could be applied.

★ ★ ★

At this same time, we developed and placed in another large steel mill our first fully automatic Heavy Duty Power Strapping Machine, combined with automatic power driven coil handling equipment. A power operated turntable automatically indexed the coil so that all three straps were put on in automatic sequence. This machine was equipped with a conveyor having power driven rolls to feed the coils to the machine as rapidly as the machine could tie them. With this equipment a single operator could strap 120 coils per hour.

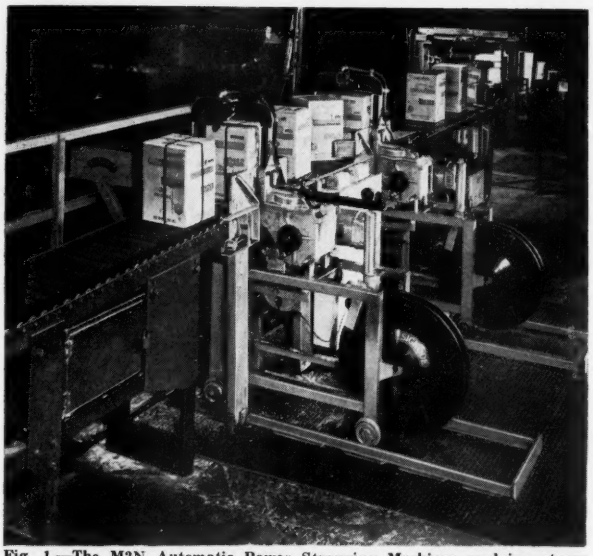

Fig. 1.—The M2N Automatic Power Strapping Machines applying straps on nail cartons. * * * * * * * * * * * * * *

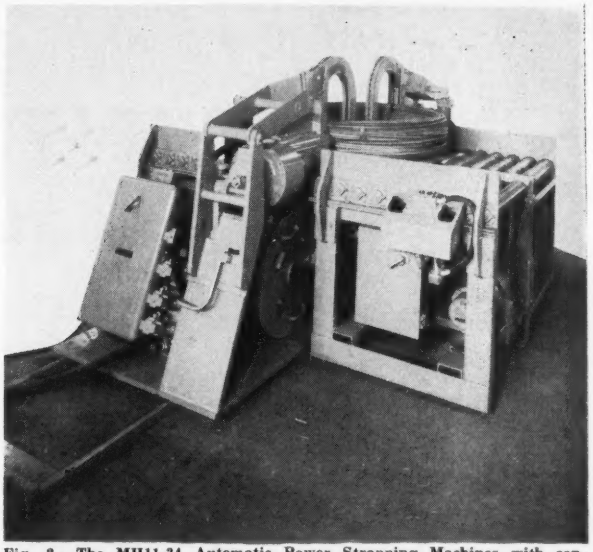

Fig. 2.—The MH11-34 Automatic Power Strapping Machines with conveyor equipment for handling and turning large wire coils. * * * *

The year 1952 was a busy one for Signode. It was then that we also placed out first Heavy Duty Power Strapping Machine equipped with a coil upender. This device reduced the amount of floor space required and permitted the operator to stay close by the machine so that he could keep the machine stocked with seals and strap. It also permitted coils to be split right on the upender. This was real progress!

★ ★ ★

In 1953, Signode made another important improvement in these machines. It was a machine with a conveyor equipped with a pusher arrangement that could handle the finer gauges of wire, without distortion.

★ ★ ★

Our customers, too, were busy developing equipment which permitted them to take greater advantage of our automatic power machines. One of our very large customers developed a very fine method of splitting coils on a 3-arm spider and then dropping the wire on to a moving conveyor which carried the coils to our machine. This arrangement made it possible for them to get maximum production from this type of equipment.

★ ★ ★

Now that we had equipment that could successfully handle big and heavy wire coils, the old story repeated itself. The mills wanted equipment that would handle even bigger and heavier coils, including coils of wire rod. I am happy to announce at this time that we now have equipment that can handle coils from 36″ to 60″ in diameter and up to 24″ in height, including coils of heavy wire rod. This equipment uses two of our Heavy Duty Automatic Power Strapping Machines placed on each side of a wide power operated conveyor. The power conveyor moves the coil into place between the two machines. The two machines move up to the coil and apply straps on the two opposite sides of the coil. Then the coil is rotated 90 degrees and two more straps are applied. With

(*Please turn to page* 1486)

Fig. 3.—The MH11-TU-34 Automatic Power Strapping Machine showing coil of wire being split on up-ender. * * * * * * * * * *

Fig. 4.—The MH11-TS-34 Automatic Power Strapping Machine. View showing sweeper arms moving coil to strapping position. * * * * *

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National Electrical Week Coming

National Electrical Week, held for the first time in 1956, has been highly organized for effective promotion in 1957. It is of major importance to every segment of the electrical industry and outstanding results are expected in 1957. Its success should mean greatly increased business for the electric wire and cable manufacturers, the branch of the industry with which we are concerned. For adequate wiring in old and new homes and buildings, the public will need large quantities of additional wire. Indirectly, it will enable householders and business building proprietors to make greater use of electrical appliances and equipment, in itself creating an increased demand for insulated wire.

Plans for the second annual observance of National Electrical Week next Feb. 10-16 as an industrywide event have met with enthusiastic response from every quarter of the electrical industry, **Merrill E. Skinner,** chairman, said in a progress report from the National Electrical Week Committee.

★ ★ ★

National Electrical Week, which is sponsored by organizations representing all of the major segments of the electrical industry, is scheduled annually for the week of **Thomas A. Edison's** birthday. "Its overall objective," Skinner said, "is to enhance public appreciation of electricity and the contributions of the electrical industry to our nation's progress and economy.

★ ★ ★

"**We** expect companies and industry groups to use the Week to promote adequate wiring, to encourage appropriate recognition of electrical pioneers, such as Edison, to impress employes with the importance of their industry, to strengthen plant-community relations, to stimulate sales of equipment, appliances and power, and to further other public relations interests."

★ ★ ★

Commenting on the national aspect of the program, he said that more than 30 companies with national advertising programs have assured the Committee of their cooperation.

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"**Those** that have already made specific plans include companies whose network television and radio shows will carry National Electrical Week messages to a total cumulative audience of more than 85,000,000."

★ ★ ★

Mr. Skinner, who is vice president and director of sales for **Union Electric Company,** St. Louis, also reported that the second broad area of the Week's activities—state and community observances staged by local committees—will be initiated this month with the mailing of a National Electrical Week Planning Guide and related program materials to industry representatives throughout the nation.

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"**This** planning guide," he said, "will provide the basis for the Week's activities at the community, regional and individual plant and company level. We are also confident that it will result in even broader participation at the national level."

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Mr. Skinner made his report following a meeting at the Biltmore Hotel in New York of representatives of the 12 national organizations sponsoring the observance.

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"**While** most of the advertisers contacted have not yet completed their plans," he stated, "we have been informed that National Electrical Week salutes are planned for the following network television shows: DuPont's 'Cavalcade,' General Electric's 'G. E. Theatre,' Reynolds Aluminum's 'Frontier,' Sylvania's 'Buccaneers,' and Westinghouse's 'Studio One'."

★ ★ ★

Allis-Chalmers is planning to feature the Week on its network radio show, "The Farm and Home Hour."

★ ★ ★

In addition, Steve Allen, Dave Garroway and Arlene Francis are planning to feature the Week on their network television programs.

★ ★ ★

Besides being of tremendous direct value, this recognition on television and radio, coupled with magazine and newspaper advertising and publicity, will provide an atmosphere of national importance that will enhance the significance of activities at local and state levels.

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A 16-page planning guide will be distributed by the sponsoring organizations to industry representatives throughout the nation.

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The booklet outlines the objectives of the program, along with the national advertising and publicity plans, and suggests numerous projects for local participants. These include such activities as civic luncheons, school programs, governmental proclamations, open houses, radio and television programs, tie-ins with the Housepower and Live Better Electrically projects, special newspaper sections, and speeches before service clubs and other groups.

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Other program aids, available from the Committee or commercial suppliers, include reproduction proofs of the official emblem, pattern speeches, pattern news releases, display kits, a television film spot, a folder on electrical progress and a home electrical inspection report. This last item, titled "Electricity In Your Home," is designed to promote safety and better understanding of the importance of adequate wiring and is expected to be given wide distribution among high school students.

★ ★ ★

In addition to companies planning to salute the Week on net-

(*Please turn to page* 1492)

Symposium on Impact Testing

In the past few years, engineers and technologists have had increasing interest in the effect of impact and shock on various materials. Both on a theoretical and practical basis, investigations have pushed forward new thinking about impact testing not confined to notch bar testing.

★ ★ ★

This symposium, sponsored by Committee E-1 on Methods of Testing, tries to fulfill the larger needs of this area of testing by including papers discussing impact and shock tests for parts, components and complete structures. Five additional papers considered timely and appropriate to the subject are included along with the material presented through the symposium.

★ ★ ★

Such innovations as the impact tube are discussed and environmental conditions, particularly temperature, are considered. The broad outlook is taken, so as to enhance the practical application of this type of work. The book contains many graphs, charts, photographs and several bibliographies.

★ ★ ★

Copies may be obtained from the **American Society for Testing Materials,** 1916 Race Street, Philadelphia, Pa., for $3.50 each.

The 400 American Standards in the Electrical Field

The American Standards Association, 70 East 45th St., New York 17, N. Y., has issued a booklet of the above title cataloging the standards for the electrical field approved by the society to date.

★ ★ ★

Included among the standards listed are those under the categories of bare wire, insulated wire, magnet wire, electrical insulating materials and conduit. Others cover electrical equipment, radios, tubes, lamps, electronic equipment components and the like. Prices for the standards are given.

The booklet is available upon request to the American Standards Association.

Foolproof Tying Wire Dispenser

A foolproof tying wire package has been announced by the Inland Pay Off Pak with the Model 0603 dispensing attachment. This attachment is affixed to the drum top by means of three thumb screws. The Pay Off Pak can be used with any type of wire tying machine. All possibility of wire tangling is eliminated, down-time is reduced and the slinger ring is easily stored. It is available for any gauge of tying wire. Height of Drum Pack is 32 inches and O. D. 21 inches. Tying Wire, for Drum Pack feeding, is available in coppered, soft basic or galvanized high tensile quality. Complete information may be had by writing to Leonard Kuckie, Sales Manager, Inland Wire Products Co., 3947 S. Lowe Avenue, Chicago, Ill.

MICROMETER PRECISION — MICRO-WELD — TRADE MARK REGISTERED

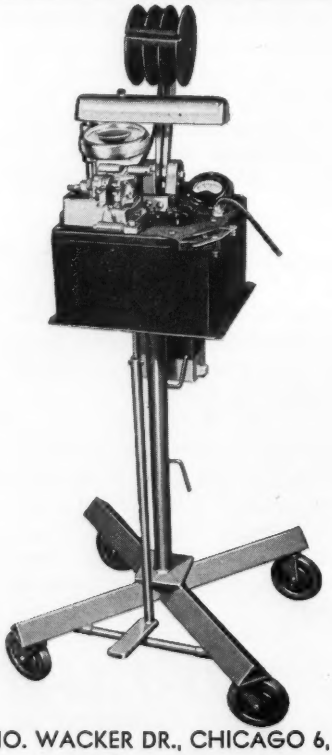
MODEL S.E.M.T. MICRO-WELD BUTT WELDER

This welder was designed and developed expressly for welding all types of fine wire: Aluminum, Copper, Brass, Bronze, Steel and Steel Alloys, ranging in size from .005" to .020" diameter.

Unit design of frame, transformer and power sub-assemblies permit other range of sizes to suit requirements.

Equipped with a temperature indicating annealing and tempering device, voltage regulator and meter to compensate for voltage fluctuation, wire cutters, extra large 5" diameter magnifying glass, fluorescent light and extension cord. Welder can be supplied for bench mounting, or mounted on 4-wheel truck.

The adaptability of this unit for welding all types of wire, either ferrous or non-ferrous, in sizes from .005" to .020" diameter, makes it ideal for the fine wire manufacturer.



MICRO PRODUCTS CO.,

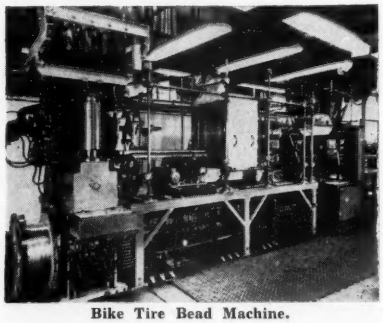
20 NO. WACKER DR., CHICAGO 6, ILL.
Telephone: STATE 2-7468

Machine Makes 3,000 Bike Tire Beads An Hour

A new continuous process bicycle tire bead machine developed by British subsidiary of **National-Standard Co.**, Niles, Mich., makes 3,000 beads an hour. Wire goes into the machine from reels at the left, is formed to circular shape, cut, ends threaded, a sleeve applied, then hammered into a tight bond and stacked, all automatically. Key to success of the machine is a rotary swager developed by **National Standard Company, Ltd.**, to bond sleeves to the wire.

★ ★ ★

The bead-making machine will be manufactured in the United



Bike Tire Bead Machine.

States if there is sufficient demand for domestic lightweight bicycles with high-pressure tires, according to **A. H. Johnson**, National-Standard president.

★ ★ ★

Most American bikes use low-pressure balloon tires with multiple strand beads, usually of 0.037″ or 0.025″, that do not impose the forming problems of the more rigid single-wire beads.

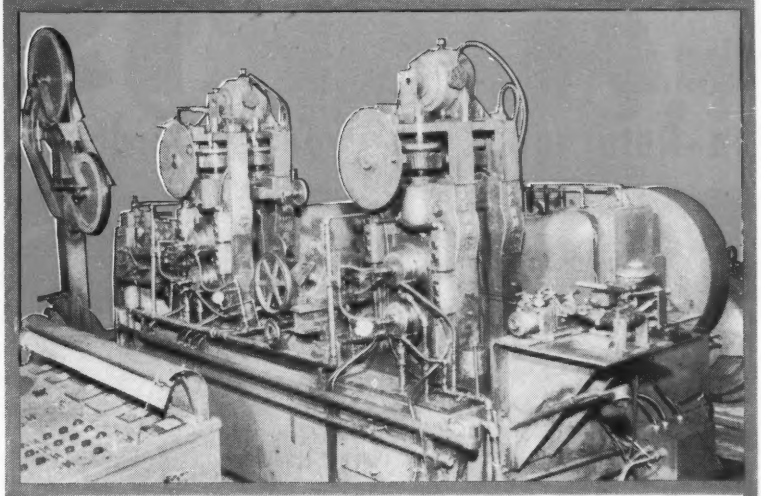
Produces Low Cost Aluminum Screw Nuts

Harvey Jacobson, president of the **Jacobson Nut Mfg. Corp.**, Kenilworth, N. J., announces that the company is currently manufacturing high tensile, aluminum hexagon machine screw nuts made by high speed automatic equipment.

★ ★ ★

For further information, engineering assistance and samples, inquiries should be addressed to the Jacobson Nut Mfg. Corp., Box 177, Kenilworth, N. J.

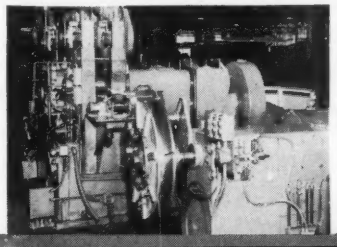
ROLLING WIRE AT 1200 FPM



THIS Fenn Model 082 Tandem Rolling Mill is in operation at the Continental Steel Corporation, Kokomo, Indiana, and is an excellent example of modern, high speed, precision wire flattening. With this mill, Continental reports production speeds of 400 FPM to 1200 FPM. Wire sizes run ranged from 0.5 in. x .130 in. at 1600 lbs., per hour down to .197 in. x .024 in. at 600 lbs., per hour.

In addition to its precision operation and compactness the Model 082 mill features a one piece bed, automatic loop regulator, power screw-downs, friction-driven edger, electronic gaging, and hydraulically traversing take-up reel.

Whatever your requirements for rolling ferrous and nonferrous metals in sheets, strips, wire or rod, it will pay you to investigate the Fenn line of Precision Rolling Mills. Fenn engineering service is available at all times to help you solve any rolling problem.



FENN

SEND FOR NEW FENN ROLLING MILL CATALOG

Precision Rolling Mills

Turks Heads

Wire Shaping Mills

Swaging Machines

Wire and Tube Drawing Machines

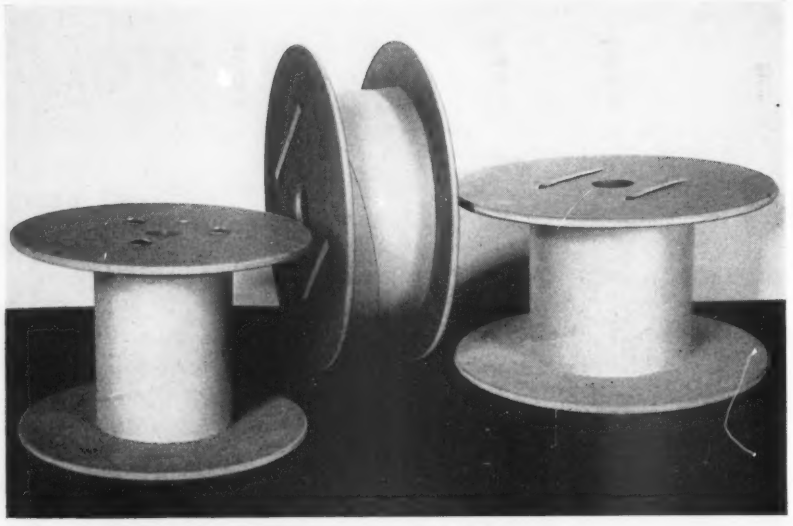
THE FENN MANUFACTURING COMPANY, 605 FENN ROAD, NEWINGTON, CONN.

ESPECIALLY DESIGNED FOR WELDING WIRE AND THE AIRCOMATIC WELDING PROCESS

CARRIS

Non-Returnable Presdwood and Hardboard

SPOOLS



Saves you

COSTLY FREIGHT

HANDLING COSTS

VALUABLE PLANT SPACE

You buy better Non-Returnable Spools when you choose Carris. They wind truer, are more uniform and are designed by men with a practical knowledge of the Wire Industry's needs. Write, wire, or phone Prospect 3-7388 your requirements. Our own trucks give almost instant delivery.

CARRIS REELS, INC.

70 PARK STREET RUTLAND, VERMONT

SPECIALISTS IN THE DESIGN AND MANUFACTURE OF PLYWOOD REELS AND SPOOLS

Product Data Folder on Coated Yarns

A new folder describes the application, properties and yarn data on Vinyl coated glass yarns, Teflon coated glass yarns, Silicone coated glass yarns and colored glass yarns. Yarn data information is given according to glass yarn sizes and average yards per lb. (5 pages.)

★ ★ ★

For a copy please write **Chemo Textiles, Inc.**, West Warwick, R. I.

United Screw to Make Phillips Head Screws

United Screw and Bolt Corp. with plants located at Chicago and Cleveland announces the completion of licensing agreements for the manufacture of Phillips Head Screws and Sems Washer assemblies.

★ ★ ★

United will carry a stock of Phillips Head Screws at both plants as well as their New York warehouse.

★ ★ ★

United also manufactures "Clutch Head" Screws which have gained wide recognition in many production applications.

New Long-Die Swaging Machine

A new Long-Die Swaging Machine built by **The Fenn Manufacturing Co.**, Newington, Conn., is rapidly gaining popularity in the tubular steel furniture industry. The new machine, capable of taking a 16 in. long taper in a single pass, is making it possible for manufacturers to produce finished, modern tapered furniture legs at the rate of 3 per minute from a variety of tubular materials including stainless steel and aluminum. The special long dies, the heart of the swager, measure 2-1/4 in. x 1-19/32 in. x 15 in. and are made to the highest standards of precision under strict quality control supervision during every step of manufacture. All Fenn die tolerances are such that die halves may be interchanged. The use of the long-die swager means an effective shortening of production time because of increased reduction

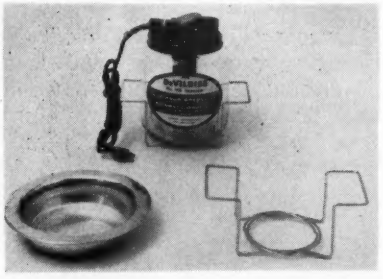
speed. Also, scrap costs are eliminated because swaging shapes metal by displacement rather than by removal.

Wire Vaporizer Stand Cuts Costs, Facilitates Handling

New, lightweight wire stands, designed by **E. H. Titchener & Co.** for DeVilbiss vaporizer-humidifiers, are attractively finished with high-lustre, moisture-resistant zinc plating. Compared to former basin-type base, left, open construction of wire stands dissipates heat more rapidly and eliminates vapor condensation. Use of simplified wire base, versus aluminum dish, resulted in cost reduction of 18%.

★ ★ ★

In the wire redesign, the vaporizer bottle is firmly clamped by



four vertical supports, spaced to conform with the jar's outer circumference. Handles extend out from either side of the jar, to prevent hands from coming in contact with it. Thus there is no possibility of tipping or upsetting the vaporizer when it is carried. This was a potential hazard with the shallow basin type.

★ ★ ★

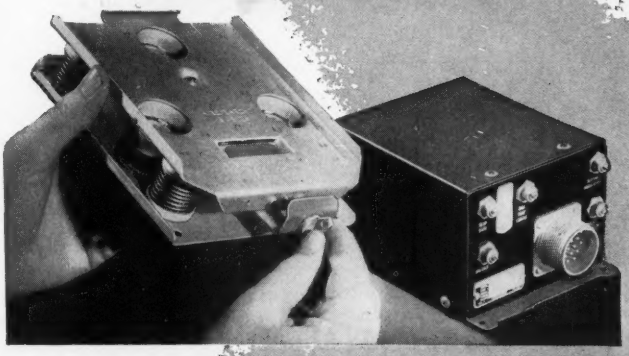
For maximum stability in use, the vaporizer is supported at all four outside corners of the stand. Base wires are elevated between corners, and two wire support rings are securely welded over them. Bottom of glass jar is thus raised sufficiently to prevent blistering or discoloration of table surface underneath.

★ ★ ★

For information on product design, write **E. H. Titchener & Co.,** 67 Clinton St., Binghamton, N. Y.

ALLOY WIRE

Cushions...



take the SHAKES out of

AIRCRAFT INSTRUMENTS

Fabricated all-metal mounts have high damping properties . . . Resist deterioration.

Robinson Aviation, Inc., Teterboro, New Jersey, uses knitted stainless steel and nickel alloy wire cushions in their new all-metal engineered mounting systems to control vibration and shock in airborne electronic equipment and instruments. Alloy wire resilient cushions have attained performance standards heretofore impossible with conventional rubber or synthetic materials.

When fabricated into a special pattern, the wire forms literally thousands of tiny interlocking springs. Their high damping characteristics and non-linear spring rate provide ample protection against dynamic overloads. Alloy wire resists deterioration by oil, water, ozone, bacteria, dust and extreme temperatures. Knitted alloy wire is used in hundreds of other industrial applications, such as filters, mist eliminators, electronic shielding. For further information send today for our Application Bulletin A-1.

ALLOY METAL WIRE DIVISION

HKP H. K. PORTER COMPANY, INC.
Prospect Park, Pennsylvania

...and here's why!

Now you can enjoy lower freight charges and greater protection against damage with the new, lighter weight NYECO steel reels. They cost so little more, last 12 times longer than wooden reels, require minimum maintenance. Rugged weatherproof, splinter-proof, warp-proof protection protects costly cable against damage due to dropping, bouncing, rough handling.

Think it over and you'll agree that it doesn't pay to risk an investment of thousands . . . and your reputation . . . on inferior reels.

* These leading mills are just a few of the many that use **NYECO** Steel Reels: **ANACONDA, GENERAL CABLE, OKONITE, PHELPS DODGE, ROEBLING, WESTERN ELECTRIC**

- *ANY QUANTITY*
- *ANY SIZE*
- *ANY LOAD*
- *FLANGE DIAMETER From 36" UP*

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G.E. Develops Ultra High Temperature Wire Coating

General Electric Company has developed a ceramic coated wire for electronic equipment operating under extremely high temperatures, such as are encountered by supersonic aircraft and guided missiles at faster-than-sound speeds and in nuclear work.

★ ★ ★

The company has facilities for producing such wires, in diameters ranging from 5 to 70 mils, for use in motors, transformers and other electrical components. It is said to function successfully even when the wire becomes literally red hot. Tests in temperatures of from 900 to 1500°F. have been made.

Insulating Materials Section Formed by G.E.

Manufacture and sale of **General Electric Company's** principal lines of electrical insulating materials have been grouped within a single organizational component, according to **R. L. Gibson,** Company vice president and general manager of the Chemical and Metallurgical Division.

★ ★ ★

Mr. Gibson announced that manufacturing facilities at Schenectady, N. Y., formerly attached to the Company's Laminated and Insulating Products Department have been assigned to the Division's Chemical Materials Department, to form a special insulating materials section with headquarters at Schenectady.

★ ★ ★

Concurrently, Chemical Materials Department Manager **S. L. Brous** announced the appointment of **Louis E. Newman** as manager of the newly-formed insulating materials section. Mr. Newman, a G.E. employee since 1929, joined the Chemical Materials Department upon transfer from the Company's Atomic Products Division.

★ ★ ★

The section will have responsibility for engineering, manufacturing and marketing of varnished cloth and papers, mica products,

insulating varnishes and compounds, special adhesives, Permafils and wire enamels.

Waterbury Farrel Buys Armzen Co.

The assets of the **Armzen Company,** designer of cold mill equipment, have been purchased by the **Waterbury Farrel Foundry & Machine Company.** The staff will become Farrel employes and **T. Sendzimir,** president, will become manager of the new Sandzimir Mill Division of Farrel.

★ ★ ★

The two local firms have been closely allied for the past 15 years. The century-old Farrel company has constructed mill equipment designed by Armzen technicians. The widely known Sendzimir Cold Mills have been built at Farrel's under license from Armzen. The division will continue its specialty in engineering, selling and servicing mill equipment.

★ ★ ★

A. Dale Mitchell, newly elected president of Waterbury Farrel, has also disclosed that the firm intends to proceed with its plans for the erection of a branch plant in the Cheshire, Conn. area.

Techalloy Produces Tiny Inconel Rod

The world's smallest Inconel Rod plays an important part in the success of the Armed Force's anti-aircraft guided missiles. This unique rod is produced by an exclusive process in the Straightening And Cutting Department of **Techalloy Company, Inc.,** Rahns, Pa.

★ ★ ★

To meet rigid specifications, this rod must maintain a 2/10,000 inch diameter and have a surface absolutely free from scratches, pits or blemishes. Though finer than a human hair, it is produced in quantity.

★ ★ ★

Prior to now the smallest S&C Inconel Rod thought commercially practical was .031″ diameter with a cross-section measuring .00075″. The new one has a .002″ diameter with a cross-sectional area of only .000031″—

EFFICIENT, MODERN SYSTEMS

FOR

ELECTRICAL WIRE & CABLE MANUFACTURING

• *CABLE LACQUERING SYSTEMS*

Conventional cellulosic, or other type, lacquers are applied in successive continuous coats from one to twenty-eight coats over fibrous braid wrapped primary conductors. One end, four ends, or eight ends of wire are handled continuously. System includes letoff, application, drying and constant tension takeup equipment.

• *WIRE ENAMELING SYSTEMS*

Natural and synthetic enamels, silicones, solution nylon, modified plastisol, and similar insulating coatings are applied to bare, cotton or glass covered wire in round, square or rectangular cross section. Ten or twenty simultaneous strands are handled. Systems are complete with letoff, preannealer, application system, capstan and multiple takeup unit.

• *ASBESTOS INSULATING SYSTEMS*

Carded asbestos is applied to continuous single conductor as an integrated operation with saturating, rotary forming, drying, cooling and polishing of the finished wire. Wire from No. 20 gauge to No. 6 AWG is handled through an asbestos wall thickness range of from .008″ to .040″ thickness in a single pass.

• *RUBBER OR PLASTIC JACKETING SYSTEMS*

Rubber and thermoplastic jacketing compounds are continuously applied to electrical wire or cable by the extrusion method. High speed, constant tension letoff and takeup equipment, controlled cooling or continuous vulcanizing equipment are powered by synchronized range drives as complete, integrated wire handling systems. Extrusion machines of customer's choice are furnished.

• *GLASS & VARNISH COATING SYSTEMS*

Double layer of glass or cotton wrapping is applied to round, flat or square conductor. Two individual coatings of high temperature varnish are applied and the finish baked in a continuous operation. Units are complete from letoffs to takeup frames.

• *SELF TRAVERSING REEL CORD DRYERS*

These ingenious machines are used to remove hygroscopic moisture from fibers, braided or knitted flexible cable. These machines increase extrusion speeds, reduce blister scrap loss and improve diameter control. They are easily installed in existing extrusion line.

TECHNICAL INFORMATION ON ANY OF THESE PROCESSES UPON REQUEST

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First in your file . . .
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Product: Steel reels, spools, bobbins
Address: Attleboro, Massachusetts
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FIRST IN QUALITY!

Whether you're looking for steel reels, spools or bobbins, you're sure to find the quality and service you expect under the world-famed *Apco Mossberg* name.

Backed by more than half a century of experience, *Apco Mossberg* engineers and craftsmen are prepared to meet your complete requirements for standard or custom-made reels, spools and bobbins . . . each to exact size, balance and trueness.

Be sure to look for the *Apco Mossberg* name the next time you consult your buyer's guide or product register. Our engineering and service departments will gladly submit recommendations based on your specifications at no obligation.

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Toronto, Ontario, Canada

APCO MOSSBERG COMPANY
LAMB STREET, ATTLEBORO, MASSACHUSETTS

200 times smaller than the next larger rod.

★ ★ ★

The development opens the door to smaller, lighter-weight electronic parts.

★ ★ ★

Additional information about special applications is available from the manufacturer.

Folder Gives Data on Electron Microscopes

A new 4-page folder which lists engineering and application information for Norelco EM-100B and EM-75 electron microscopes is available from the Instruments Division, **North American Philips Company, Inc.,** 750 South Fulton Avenue, Mount Vernon, N. Y.

★ ★ ★

Forty-four typical uses for electron microscopes are tabulated along with operating data for two electron microscopes, one designed to handle the most difficult problems and the other for majority cases where minimum investment is important.

★ ★ ★

Information covers accelerating potential, resolution, variable magnification, transmission electron diffraction, reflection electron diffraction, focus determination, viewing screen, 35 mm and plate cameras, stereo pictures, and power requirements.

Swaged Assemblies of Wire Rope and Fittings in New Catalog

Just announced is a new catalog of many swaged wire rope assemblies. These assemblies consist of a length of preformed wire rope with a terminal attached to one or both ends. Each end can be a different terminal fitting such as a threaded stud, oval eye, pin eye, clevis, hook, fork, turnbuckle, etc.

★ ★ ★

New 24-page 8½ x 11 catalog gives all dimensions, drawings, capacities, sizes of both terminals and wire rope. It is called "Industrial Standards Macwhyte 'Safe-Lock' Wire Rope Assemblies" and the catalog number is 5601. Available free on request to **Macwhyte Company,** Public Relations Department, Kenosha, Wis.

Outstanding Personalities of the Wire Industry

Crucible Steel Appointments

Crucible Steel Company of America has announced the following appointments at Midland, Pa.: **Charles Yutmeyer,** superintendent, Steel Works Div., **J. L. Edwards,** superintendent, Bar Mill Div.; **D. H. E. Genter,** superintendent, Forge Blank Dept.; **J. E. Holt,** superintendent, 24 in. Bar Mill Dept.; **A. C. Redding,** superintendent, Cold Drawing and Cold Finishing Depts.; **J. M. Walton,** asst. to works manager; **R. C. Gilroy,** chief industrial engineer; and **Edward Troutman,** named supervisor of safety.

Association Clock Wound for 1957

The 400-day grandfather clock presented to **The Wire Association** by our British members in 1948 again was officially wound on October 23rd for another year of accurate time-keeping.

★ ★ ★

The winding, traditionally performed by a British member, was done this year by **John M. Avison,** Director of **Ramsden Camm and Co., Ltd.,** Brighouse, Yorks, England, in a ceremony held at the Association's headquarters in Stamford, Connecticut.

John M. Avison

★ ★ ★

Mr. Avison, who came over to attend the Annual Convention in Pittsburgh, is combining his visit to our Convention with a business trip. His company manufactures a variety of ferrous and non-ferrous wires and is England's leading producers of brass brush wire.

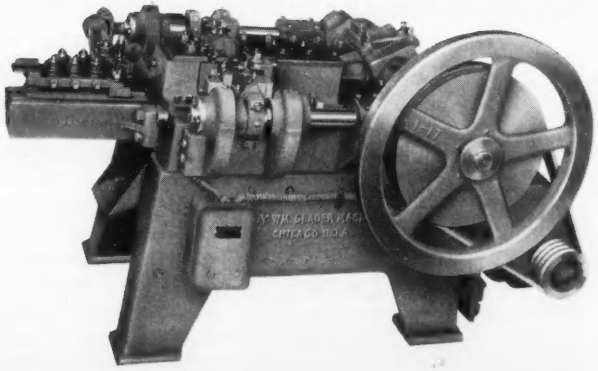
★ ★ ★

The Association is grateful to Mr. Avison for his kind acceptance of the clock-winding responsibility, which he discharged with grace. His name will be inscribed on the parchment scroll that hangs on the wall beside the clock containing the names of those who have served in this capacity each year, starting with **John Rigby** in 1948, who made the presentation of the clock at the Convention in Pittsburgh in that year. The massive

GLADER NAIL MACHINE

a NAME and MACHINE
that have stood for
DEPENDABILITY since 1887

$ $ $ $ $ $ $ $ $ $ $ $ $
our Nail Machine
"KNOW-HOW"
means $$$ for you



Wm. GLADER MACHINE WORKS 210 N. RACINE AVENUE CHICAGO 7, ILLINOIS

EXPORT DEPT. 122 EAST 42ND STREET • NEW YORK 17, N. Y.

mahogany case of the clock was made in England about the year 1770.

Made Production Manager, Cyclops Division

John P. Beal, Jr., former Assistant Works Manager of the Titusville, Pa. plant of the **Universal-Cyclops Steel Corp.,** has been named Production Manager, Cyclops Division.

★ ★ ★

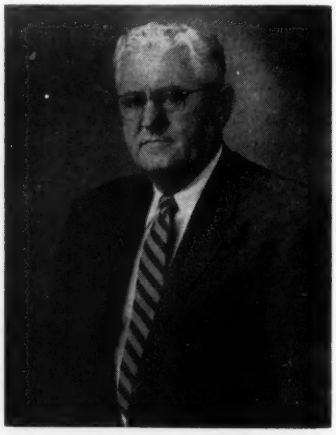
In this capacity, Mr. Beal will be responsible for operation and production planning, reporting directly to the General Manager of the Division. He is a Chemical Engineering graduate of Lehigh University and has been associated with Universal-Cyclops since 1941 in metallurgical and operating capacities.

ACCO Appoints General Manager

Harvey W. Seymour has been appointed to the newly created position of General Manager, **Page Steel and Wire Division, American Chain & Cable Co.,** Monessen, Pa., according to an announcement by **Cyrus N. Johns,** President.

★ ★ ★

Mr. Seymour, a veteran of 30 years with ACCO, has been associated with every phase of production and management since 1930



Harvey W. Seymour

and is well qualified for his new duties. For the past 16 years he was Plant Manager of the Monessen works.

★ ★ ★

He started with Page in 1926 and in 1930 was appointed General Superintendent, a position he held until 1940. A graduate of Rensselaer Polytechnic Institute, class of 1924, he holds a degree in Chemical Engineering.

Heads Research at Republic

Earle C. Smith has been appointed Director of Research for the **Republic Steel Corp.,** Cleveland. He will continue as chief metallurgist. Mr. Smith will supervise the new research laboratory to be constructed in Independence, O.

NORBIDE* Abrasive Grain...

Ready to cut Your Refinishing Costs!

Wire men who have switched from costly diamond dust to NORBIDE Abrasive for refinishing dies are amazed at the savings. They have found NORBIDE Abrasive — the hardest manufactured abrasive commercially available—ideal for ripping and semi-finishing operations. Whatever your requirements, we can supply you promptly from stock.

For details and prices on this cost-cutting abrasive, write for form 559, NORTON COMPANY, 45 New Bond St., Worcester 6, Mass.

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BORON CARBIDE
Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories.
BEHR-MANNING PRODUCTS: Coated Abrasives Sharpening Stones • Behr-cat Tapes
*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

NORBIDE* | *The hardest manufactured abrasive commercially available!*

Appointed Executive Vice President of Igoe Brothers

Hugh A. Cole yesterday was elected Executive Vice-President of **Igoe Brothers, Inc.,** Newark, N. J. The announcement was formally made by **James V. Igoe** for the board of directors of the corporation.

★ ★ ★

The company, including its numerous subsidiaries, is engaged in the hardware, steel, wire and building material business in New York and New Jersey. It also is northern New Jersey distributor for a number of nationally known appliances.

★ ★ ★

Mr. Cole has been connected with Igoe Brothers, Inc. in various capacities for the past eight years.

Made Works Manager of Prentiss

Matthew J. Donachie, former President, Chief Metallurgist and Director of **Beryllium Corporation,** Reading, Pa., was appointed Works Manager of **Prentiss Wire Mills,** Holyoke, Mass., effective October 22, according to an announcement by **W. Harvey Thompson,** Vice President and General Manager of **Riverside Metal Div.,** H. K. Porter Co. Prentiss' operations were combined with those of the Riverside, New Jersey, mill earlier this month. Mr. Donachie has been metallurgical consultant to **Lear, Inc.; Accurate Spring Mfg. Co.; Dempsey Furnace Co.** and other metalworking firms.

★ ★ ★

He came to this country from Scotland in 1926. He studied at Technical College, Coatbridge, Scotland, and Franklin Union Institute, Boston. As a result of his work on the properties of beryllium copper, he was given the Medal Award by The Wire Association for the most meritorius contribution to the advancement of the wire industry in 1945. He is a member of ASM, ASTM, The Wire Association and the Society for Military Engineers.

★ ★ ★

In addition to the prominent position Mr. Donachie has held in the metal industry, he has for many years been active in the field of technical education and has lectured to college and professional groups. In 1950, he was selected as the American delegate to the First World Metallurgical Conference in Detroit.

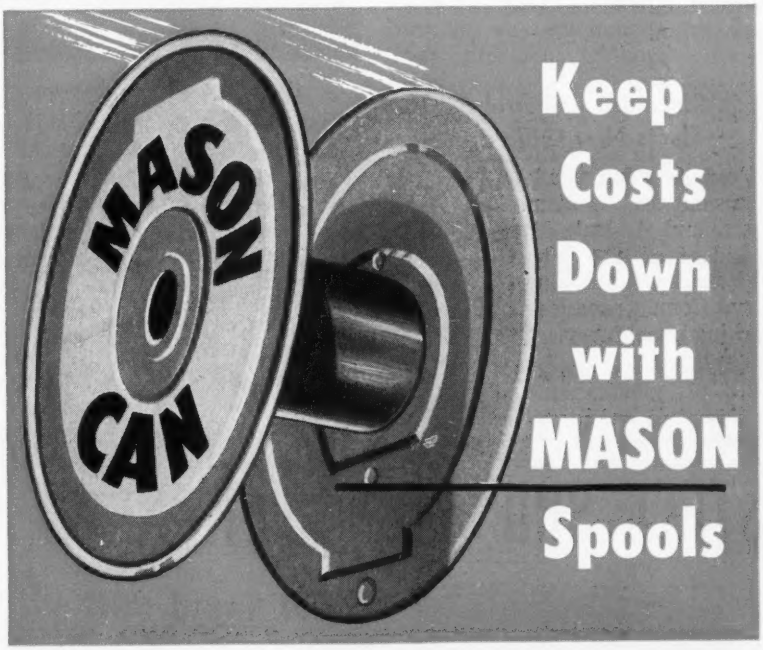
★ ★ ★

In his new position, he will manage the Prentiss unit and will coordinate its activities with those of the Riverside mill. As a member of the management group of Riverside Metal Division, Mr. Donachie's unusual technical skill and experience will be of great value in the production of all of the division's alloys.

Louis Winkler Honored

Louis H. Winkler, metallurgical engineer with **Bethlehem Steel Co.,** and Honorary Member and former Director of ASTM, was honored earlier in the year by selection to receive the American Petroleum Institute's "Citation for Service."

★ ★ ★



MASON *lightweight, non-returnable, lithographed spools for:* **INSULATED WIRE · SOLDER WIRE THERMO-COUPLE WIRE · TV LEAD-IN WIRE AUTOMOTIVE CABLE**

BEST FOR LESS! That's what 175 leading manufacturers say about Mason Spool dependability and performance.

And they help you sell, too! Mason lithography (to meet your specifications) will always assure color uniformity and sharpness of detail for *instant brand identification.*

MASON lightweight, non returnable spools are available in 5", 6½", 8½", and 10½" head sizes. All sizes are available with 1⅞" (Dia.) barrel. The 10½" head size is also available with a 3½" (Dia.) barrel. Barrel lengths from ⅝" to 14".

Tell us about your spool requirements NOW! We'll prove Mason Spools keep costs down—sales up! Telephone East Providence 1-2810 or write:

MASON CAN COMPANY

1949 Dexter Road, E. Providence 14, R. I.

Branch Plant — Greenville, Ohio

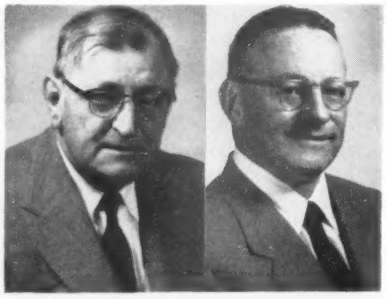
The award was made in recognition of outstanding service as a member since 1938 of the API Manufacturers Subcommittee on Standardization of Tubular Goods and a member since 1939 of the Manufacturers Subcommittee on Wire Rope. Mr. Winkler has been concerned with a wide variety of steel products during his career, but much of his work has been in the fields of rails, wheels and railroad products, wire and wire products, and piping and tubular products. He has been active in the work of ASTM for more than 40 years. He is a member of The Wire Association.

Waterbury Farrel Elects New Officers

Fred S. Van Valkenburg has been elected Chairman of the Board and **A. Dale Mitchell** made President of **The Waterbury Farrel Foundry & Machine Co.,** Waterbury, Conn., producers of metalworking machinery.

★ ★ ★

Mr. Van Valkenburg who has been a Vice President and director of the company for several years replaces **R. L. Wilcox** who retired from the position of Board Chairman several months ago.



(Left) Fred S. Van Valkenburg
(Right) A. Dale Mitchell

Mr. Mitchell, formerly Treasurer of the company, takes over the position of President which was vacated by the death of **Joseph Schaeffer** in September of this year.

★ ★ ★

Mr. Van Valkenburg was born in Minneapolis, Minn., and has been with Waterbury Farrel since 1910. As head of the company's Wire Mill Machinery Division, he has become well known in the wire drawing industry as well as in the eyelet machine field.

★ ★ ★

Mr. Mitchell was born in Slate Hill, Pa., in 1902. He came to Waterbury Farrel in 1942 as Assistant Treasurer and Comptroller. He was elected Treasurer and made a director in 1954.

Clem McGowan Made Honorary Director

C. L. McGowan, superintendent of **Atlantic Steel Company's** Wire Departments, was elected an honorary director for life of **The Wire Association** at its annual meeting on October 29, in Pittsburgh. He also was accorded the privilege of attending all directors' meetings.

★ ★ ★

This marks the first time that the Wire Association has so honored one of its members. The honor

STEEL SHIPPING CONTAINERS *for* WIRE PAK*

FEATURING:

- TOP AND BOTTOM SUPPORT FOR INNER CORE
- SMOOTH SEAMS THROUGHOUT
- SALVAGE VALUE FOR WIRE PAK PAILS
- APPROVED STANDARD SPECIFICATIONS

HUBBARD also makes all types and constructions of spools and reels, offering one dependable source for any type of wood, metal, paper or fibre reel or spool desired.

We invite your inquiries.

HUBBARD SPOOL COMPANY
GARRETT • INDIANA
Tel.: GArrett 840

*Trademark

Exclusive representatives of Vulcan Containers, Inc. to the Wire and Cable Industry.

"THE BIGGEST NAME IN SPOOLS AND REELS"

was made in recognition of Mr. McGowan's many years of active association service.

★ ★ ★

A charter member of the association since its founding in 1930, Mr. McGowan has held the office of vice-president, and has been a national director for nine years. In 1951, he was instrumental in having the Association hold its first and only regional Southern meeting in Atlanta.

★ ★ ★

Mr. McGowan was also honored by his company recently on the occasion of his completion of 50 years of service, for which he received a gold pin and an engraved plaque from President **R. S. Lynch.**

Corrosion Engineering Specialist for Pennsalt

Douglas F. Woolley, Jr. has been promoted to Sales Engineer of **Pennsalt Chemicals'** Corrosion Engineering Department. In this capacity, Corrosion Engineering Sales Manager **Robert R. Pierce** announced, Mr. Woolley will specialize in assistance on corrosion problems in fields where application of Pennsalt's line of corrosion resistant coatings, linings, interliners, and acid proof cement mortars are recommended.

★ ★ ★

He is a graduate of Johns Hopkins University and has been with Pennsalt since 1952. He was a member of the technical service department prior to his present assignment.

Elected VP by American Brass

Allen W. Rockwell was made Vice President in charge of the Waterbury Division of **The American Brass Company.** He succeeds **Ralph T. Benedict,** who retired after 52 years service. The announcement was made by **John A. Coe,** President.

★ ★ ★

Mr. Rockwell entered the employ of the company in the east tube mill of the Waterbury Division in 1935, after attending Colby College. In 1938, he joined the division's personnel and employment office, and the following year was appointed labor supervisor. From 1946 to 1953, he was division works manager. He was made manager of the division three years ago.

Engineer Joins Sam Tour

Martin Aaron, Materials Engineer in the plastics and chemicals fields, has been appointed Assistant to the President of **Sam Tour & Co., Inc.,** and its affiliate the **American Standards Testing Bureau, Inc.,** it was announced by **Sam Tour,** president of both corporations.

★ ★ ★

Mr. Aaron will be in charge of customer relations and product certification programs of the American Standards Testing Bureau, Inc. and will assume general management and customer relations responsibilities involved in the programs of corrosion and other testing of Zirconium and special alloys being undertaken by Sam

INTERNATIONAL *Fine Wire Co., Inc.*

Precision Wire Drawn to Your Specifications

SILVER PLATED COPPER WIRE

Concentric Stranded Bunched & Single End. 1¼-1½ to 4% Silver Coated on Copper by weight. Amount of Silver accurately controlled for thickness and purity to meet U. S. Government specifications.

Constructions supplied to your special design.

WE ALSO SUPPLY:

NICKEL • NICKEL PLATED WIRE • RESISTANCE WIRES • MONEL • COPPER AND ALL TYPES OF STAINLESS STEELS—BOTH SINGLE END AND STRANDED FORMS

In Special Tempers, Annealed, Bunched and Stranded, etc.

1 GREENWOOD AVENUE • MIDLAND PARK • NEW JERSEY

Telephone: Gilbert 4-2151

Tour & Co., Inc., for Atomic Energy power contractors. He has had long experience in the fabrication and testing of chemical and high pressure equipment.

Benjamin T. Root

Benjamin T. Root, President of the B. M. Root Co., York, Pa., died October 8 at the York Hospital, as the result of a fall at his residence. He was 75. The company manufactures machine tools for the woodworking, plastics and metals industries, and is particularly well-known in the wire industry for its multiple-head reel borers for making wood reels.

★ ★ ★

Mr. Root was a graduate of Lehigh University, class of 1906; a life member of the Engineering Society of York; and was active in civic and church affairs. He was the son of the late B. M. Root who founded the B. M. Root Co. in 1898.

L. E. Chambers

His former associates in the **Chapat Engineering and Sales Co., Ltd.,** Hamilton, Ont., Canada, have announced with sorrow the passing of the company's President and General Manager, **L. E. Chambers,** on September 10, 1956, at his home in Burlington, Ontario. Mr. Chambers had been ill for some time.

★ ★ ★

He had headed the company since its organization in 1944 and had been a member of The Wire Association for the past seven years.

Victor J. Boulin

Victor J. Boulin, President of **Victor J. Boulin, Inc.,** 10 First St., Pelham, N. Y., died last July. He had been a member of The Wire Association for 25 years and his passing is a great loss to all who knew him. During his long association with the wire industry he had supplied the mills with diamond wire drawing dies and had been manager of the **Vianney Wire Die Works** prior to the organization of his own company a few years ago.

Paul A. Meyer

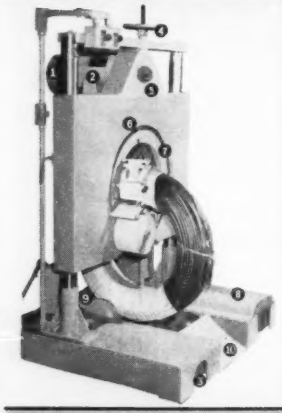
It was announced recently that **Paul A. Meyer** passed away at the age of 64. Mr. Meyer was Vice-President in charge of engineering, Secretary and served on the Board of Directors of the **Michigan Oven Company** since 1949. He was also a founder of that company.

★ ★ ★

Mr. Meyer spent several decades as a heating specialist. His background included several years with General Electric, Schenectady and 25 years as Chief Engineer of Young Brothers Company. He was a graduate of the University of Kansas.

Joins Brookfield Wire

Lawrence J. (Larry) Woods, Jr., formerly with the **Morgan Construction Company,** Worcester, Mass., has accepted an invitation to become Sales Manager of the **Brookfield Wire Company,** Fiskdale Road, Brookfield, Mass., producers of fine ferrous and non-ferrous wires for industry. The appointment became effective as of November 1, 1956.



1 man can operate McLaurin-Angier's NEW UW-10 spiral wrapper . . .

These features make it the most versatile machine available

1. Automatic electric brake.
2. Direct connected high starting torque motor.
3. Shuttle jog control.
4. Vertical shuttle adjustment. (Power drive available)
5. V-Belt shuttle drive (concealed).
6. Ball-bearing shuttle rolls.
7. Forged steel shuttle.
8. Separate motor for feed roll drive (concealed).
9. Horizontal feed roll adjustment (both rolls).
10. Roll-in loading.

McLaurin-Angier Co., Needham Heights, Mass.

M-A

GET FACTS ON THE UW-10 AND OUR FULL LINE OF SPIRAL AND BAR PAPER WRAPS.

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50¢ for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,764,778, POULTRY SHACKLE, patented October 2, 1956 by Harry J. Long, Chicago, Ill., assignor to Swift & Company, Chicago, Ill., a corporation of Illinois.

The shackle is constructed wholly of wire.

★ ★ ★

No. 2,765,022, SPRING COILING MACHINE, patented October 2, 1956 by Charles R. Bergevin, Torrington, Conn., assignor to The Torrington Manufacturing Company, Torrington, Conn., a corporation of Connecticut.

A cyclically-operable spring wire coiling machine is disclosed and claimed in sixteen claims which include a shunt guide means.

★ ★ ★

No. 2,765,124, COIL WINDING APPARATUS, patented October 2, 1956 by Royal F. Sickles, Springfield, Mass., assignor to General Instrument Corporation, Elizabeth, N. J., a corporation of New Jersey.

The apparatus is adapted to wind wire on coil forms but with an end portion extending longitudinally therefrom. There are ten claims.

★ ★ ★

No. 2,766,889, LIP PROTECTOR, patented October 16, 1956 by Charles J. Rey, St. Louis, Mo.

This device is formed of wire and adapted to function as a drainer attached to the open upper mouth of a receptacle.

★ ★ ★

No. 2,766,945, WIRE WINDING APPARATUS WITH CONSTANT TENSION, patented October 16, 1956 by Adolph Reich, Backnang, Wurttemberg, Germany, assignor to Firma Willy Aumann, Werkstatten fur Feinmechanik und Apparatebau, Lohne, Westphalia, Germany.

For winding wire upon a spool or the like, the inventor provides a dual-lever system associated with a brake shoe and brake drum carried by one of the levers.

★ ★ ★

No. 2,766,983, SPIRAL SPRING CONSTRUCTION, patented October 16, 1956 by George E. Taylor, Chicago, Ill.

A multiple coil spiral spring formed from spring wire is disclosed, to afford a number of coils terminating in end coils having free ends, such free ends being wound about anchoring portions of the spring wire to afford knots for determining and maintaining the diameter of the end coils, these knots being fixed to the anchoring portions by spot welding to afford mechanically interlocking flat faces between the knots and the anchoring portions.

★ ★ ★

No. 2,767,411, NAIL MAKING MACHINE, patented October 23, 1956 by Frank A. Clary, Jr., and Grant N. Willis, Bristol, Conn., assignors to Pittsburgh Steel Company, Pittsburgh, Pa., a corporation of Pennsylvania.

This machine is of the reciprocating die and header class for making nails from a wire supply. There are thirteen claims.

★ ★ ★

No. 2,767,829, APPARATUS FOR DRAWING ROD STOCK, patented October 23, 1956 by Karl William Hallden, Thomaston, Conn., assignor to The Hallden Machine Company, Thomaston, Conn., a corporation of Connecticut.

A pre-draw unit for rod stock is disclosed and claimed in ten claims.

★ ★ ★

No. 2,767,932, COIL HANDLING APPARATUS, patented October 23, 1956 by Earl L. Valin, Chicago, Ill., assignor to Revere Copper and Brass Incorpor-

WIRE and WIRE PRODUCTS

reaches many prospects

YOUR SALESMEN DON'T KNOW!

No matter how big you are, the odds are you don't know all your actual prospective customers. If your company is small, it is even more important to be "calling" on your prospects and customers regularly through advertising.

Your advertising in Wire and Wire Products will be seen by many people in the plants you wish to "sell" whom your salesmen never would see, yet who specify, actually buy or who influence decisions on products to be purchased. Your advertising is bound to be of immeasurable value to you, too, in paving the way for a good reception for your salesmen when they do call. And the field's buying power is tremendous!

WIRE AND WIRE PRODUCTS circulation is all paid. We have no agents, offer no premiums or make special inducements to get circulation, except the value of the editorial contents in itself—yet our renewals have averaged 97% or better for many years. That's why it is a good and forceful advertising medium for all concerns who have products to sell to the wire industry.

- **GET YOUR SHARE OF THE BUSINESS . . .**
- **ADVERTISE IN WIRE AND WIRE PRODUCTS . . .**
- **SEND FOR ADVERTISING RATES TODAY . . .**

WIRE and WIRE PRODUCTS

453 MAIN STREET **STAMFORD, CONN.**

ated, New York, N. Y., a corporation of Maryland.

More specifically, this apparatus is for winding and upending wire coils and includes a blocker having a free end over which the coil may be removed, and a swingable arbor for receiving the coil from the blocker and upending it.

★ ★ ★

No. 2,768,425, ART OF PRODUCING ELECTRICAL CONDUCTORS, patented October 30, 1956 by Karl H. Andren, Greenfield, Wis., assignor to Artos Engineering Company, Milwaukee, Wis., a corporation of Wisconsin.

There are five claims to the method of producing wire conductors having terminals attached to insulation-covered wires.

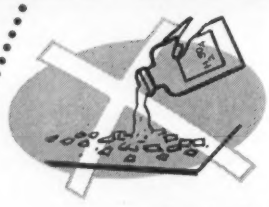
★ ★ ★

No. 2,768,428, APPARATUS FOR ASSEMBLING WIRING HARNESS, patented October 30, 1956 by Basil N. MacGregor and Carl C. Rigsby, Warren, Ohio, assignors to General Motors Corporation, Detroit, Mich., a corporation of Delaware.

An apparatus is disclosed for use in assembling and taping together a plurality of wires of different length and which are adapted to be located in predetermined positions relative to each other so as to form a wiring harness for automotive vehicles or the like.

STANNOUS SULFATE . .

A PREPARED chemical of UNIFORM quality for LIQUOR FINISHING



ELIMINATES haphazard preparation

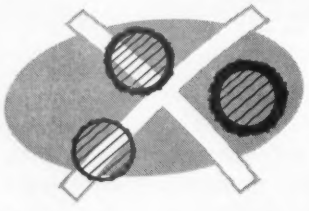
—Standard stock solutions are easily and quickly made up in advance . . . stannous sulfate composition is known, and is uniform from batch to batch.

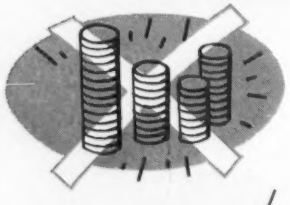
ELIMINATES complex control

—there are only two simple ingredients to control . . . color adjustment is quick and simple and may be made immediately.

ELIMINATES uneven quality

—tin content is divalent, the only form suited for iron replacement reaction . . . tin coatings are smooth and uniform, and of pre-determined thickness.





ELIMINATES unnecessary costs

—replaces needless processes, saves tin and copper, saves on time and labor, improves quality of tin coating.

Write for detailed information.

TIN & TIN CHEMICALS
CERAMIC MATERIALS
ORGANIC COATINGS
WELDING SUPPLIES
RADIOGRAPHIC EQUIPMENT
PLATING MATERIALS
METALS & ALLOYS
HEAVY MELTING SCRAP

"First Name in Tin Chemicals"

METAL & THERMIT CORPORATION

GENERAL OFFICES: RAHWAY, NEW JERSEY

Ardox Spiral Nails Made by J & L

The "Ardox" Spiral nail—one of the most significant advances in common wood fasteners since the first machine-made nail was produced 180 years ago—is now being manufactured and marketed in the United States by **Jones & Laughlin Steel Corp.,** Pittsburgh.

★ ★ ★

J & L is producing the "Ardox" Spiral nail under a licensing agreement with **The Steel Company of Canada, Limited,** which developed the nail and process for producing it after years of extensive research.

★ ★ ★

Clarence Kendall, J & L's Manager, Wire Products, said: "We expect that the 'Ardox' Spiral nail will in large measure replace the common smooth shank nail because of its much higher quality combined with a price reduction of approximately 5 per cent per nail." The company is one of the largest manufacturers of nails in the world, making over 1,000 different sizes and types.

New Agent for Pennsalt Corrosion-Resistant Products

Contract Engineering Co., Denver, Col., has been appointed agent for Pennsalt Chemicals corrosion-resistant products, department sales manager **Robert R. Pierce** has announced.

★ ★ ★

The company will represent Pennsalt in the mountain states area of Arizona, New Mexico, Colorado, Wyoming and West Texas. It will handle the full line of Pennsalt coatings, cement mortars and interliners for corrosion-proof masonry construction and offer complete professional services in design and specification of chemical-resistance construction and coatings.

★ ★ ★

Sample specifications, engineering drawings of typical construction methods, detailed resistance charts and assistance on special corrosion problems are available from Pennsalt Corrosion Engineering agents in all areas of the U. S.

Thermistor Costs Decrease

Prices on volume quantities of its temperature compensating de-

vices for electrical and electronic equipment components, referred to as Thermistors, are now down by about 20 per cent, **General Electric's** Metallurgical Products Dept. in Detroit has reported.

★ ★ ★

The price decrease which applies to volume orders in the range of 50 to 10,000 pieces, covers units in the form of disks, rods, washers and washer assemblies and is the result of improved and expanded manufacturing facilities.

Welding Rod Comparison Chart

An informative and useful 4-page flyer, Bulletin DH-1218-J, has been prepared and released by the **Page Steel and Wire Div., American Chain & Cable Co.,** Monessen, Pa.

★ ★ ★

It details the physical properties as welded, gives analysis, tensile strength, elongation, average Rockwell hardness and lists typical uses of gas welding rods, bare electrodes, automatic welding wire and metal spray wire. Comparisons between the Page Division products and virtually all competitive makes are listed.

Aluminum Screen Cloth Cleaning and Brightening

Aluminum fly screen cloth may be more efficiently and economically cleaned and brightened prior to finishing with a new mildly alkaline composition developed by **Apex Alkali Products Company** of Philadelphia 27, Pa.

★ ★ ★

The compound's ability to clean and brighten rapidly, coupled with long solution life and minimum sludging, holds great interest to the screen cloth fabricators.

★ ★ ★

Additional information may be secured by writing directly to the company.

Reynolds to Produce Insulated Wire at Sheffield

A new addition to **Reynolds Metals Company's** aluminum wire and cable mill at Sheffield, Ala., for production of neoprene and polyethylene covered and insulated electrical conductors is nearing completion, according to an announcement by **J. Louis Reynolds,** the firm's executive vice-president.

★ ★ ★

The facilities are housed in a new building, bringing total floor space of the overall cable operation to 174,000 square feet. New equipment for applying thermosetting and thermoplastic coverings will be used initially for neoprene and polyethylene insulation. Equipment for fabricating self-supporting aerial secondary cables also has been installed.

★ ★ ★

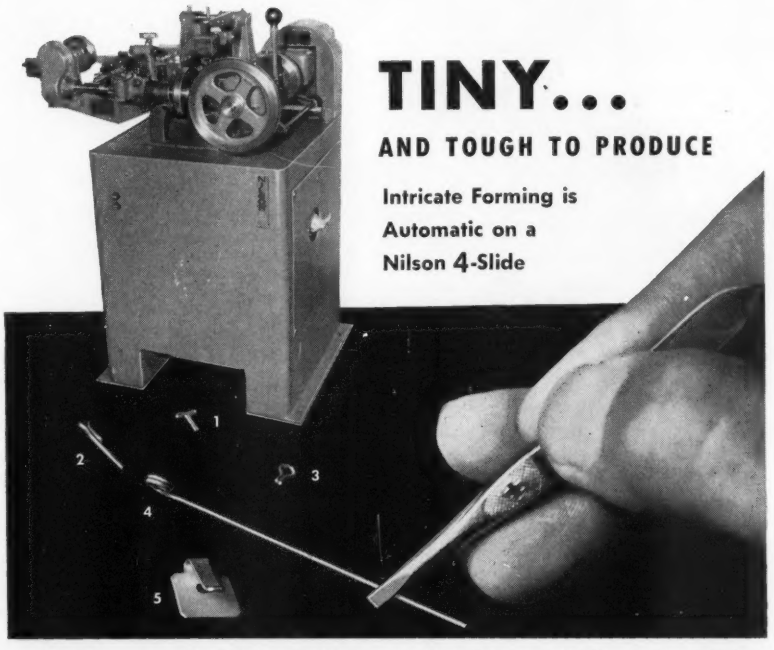
Complete equipment necessary for quality testing has been added. The tests include those for dielectric strength after water immersion, tensile and elongation tests before and after oil immersion, as well as oxygen bomb and air oven tests.

★ ★ ★

Manager of the plant is **D. H. Hipp.** The cable mill superintendent is **H. M. Barbour.**

Offers New Wire Gauge and Footage Chart

A compact, handy wire gauge and footage chart is offered by



Small wire and ribbon metal forms shown here in actual size are typical examples of modern precision production on a Nilson #00 4-Slide. Compact in size, this 4-Slide produces up to 375 pieces per minute in material not exceeding .040 dia. and 3" in blank length. Easily access to tooling, accurate feeding to within .003, and rugged construction assures years of precision forming.

1 **Mercury Switch Part** . . . .014" x .019" platinum wire, formed with tolerances within .001" on over-all length. Production rate, 175 per minute.

2 **Electrical Contact** . . . .0076" x .0030" wide phosphor bronze formed at a production rate of 200 per minute.

3 **Swivel Part** . . . .025" brass wire. Heading operating includes eye formed with tolerances within .008", shank within .003 tolerance. Production rate, 300 per minute.

4 **Leadwire** . . . .026" soft tinned copper wire formed at a rate of 140 per minute with two 7/64" diameter windings.

5 **Contact Part** . . . .010" x 3/8" wide phosphor bronze formed at 175 per minute.

A.H. NILSON MACHINE COMPANY

1516 RAILROAD AVENUE, BRIDGEPORT 5, CONN.

Automatic Chain Making Machines • Staple Forming Machines • Wire and Stock Reels • Wire Straightening Equipment • Slide Feeds for Presses • Wire and Ribbon Stock Forming Machines

Little Falls Alloys, Inc.

★ ★ ★

This chart determines gauge and footage readings in Brown & Sharp (A.W.G.) wire gauges for Beryllium Copper, Phosphor Bronze, Titanium and other non-ferrous alloys.

★ ★ ★

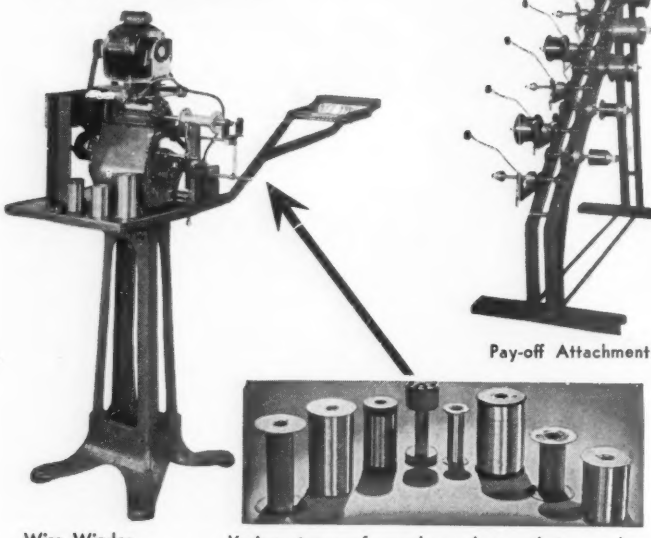
A special section highlights physical and chemical properties, showing the tensile strength, chemical composition and electrical conductivity of the various alloys. The table also includes A.S.T.M. temper and reduction data in terms of numbers hard versus % reduction of area.

★ ★ ★

The last page of this pamphlet lists the many non-ferrous wires manufactured, in both round and flat styles, for springs, forms, electronics and special purposes by LFA. The chart is available without charge by writing Department V, **Little Falls Alloys, Inc.,** 189 Caldwell Avenue, Paterson 1, N. J.

STANDARD UNI-DRIVE WIRE WINDER

INCREASE YOUR PRODUCTION
WITH THIS WINDER



Pay-off Attachment

Wire Winder

Various types of supply packages that may be wound on Standard Uni-Drive Wire Winder.

PAYOFF

Our payoff attachment is made with self-aligning ball bearings and a compensating attachment to control the tension of each end. Applies same tension when spool is empty as when full.

The new Uni-Drive Winder with Payoff Attachment is new in design and incorporates several improved and tested features. Production is stepped up through increased speed. It produces smooth, even and accurately wound spools of wire in single or multiple ends. All strands parallel—no over or under-winding. Automatic Stop-Motion controls each strand. Compensating attachment produces perfectly controlled tension. Traverse adjustable from 1¾" to 5½" between spool heads without changing cam. Designed especially for winding wire to be braided and shielded for electrical conductors up to ¾" diameter.

Payoff can be equipped with Carboloy Guide Inserts at additional cost.

STANDARD MILL SUPPLY COMPANY
PAWTUCKET, RHODE ISLAND, U.S.A.
31 Esten Avenue
PAwtucket 3-1534 — 3-1535 — 3-1536

New Beryllium Alloy Wire Resists Flexing Fatigue

Little Falls Alloys, of 194 Caldwell Ave., Paterson, N. J., have announced the development of a new high conductivity beryllium copper alloy wire.

★ ★ ★

The wire, Silvercote* No. 10 Alloy, is composed of .5% beryllium, 2.5% cobalt and the balance of copper. It has 65 to 70 per cent conductivity of copper and will resist fatigue from flexing and vibration and withstand higher temperatures than ordinary copper wire.

★ ★ ★

The wire comes with a light silverplating that makes it easy to solder. This plating also makes it possible to apply the new type insulating materials that require higher curing temperatures than tinned wires can stand. It is available in all fine wire gauges in solid or stranded form.

★ ★ ★

A descriptive folder will be mailed on request.

***Register Trade Mark.**

NEMA's Electrical Code Changes Analyzed

"Analysis of 1956 Revision of the National Electrical Code," the latest in a 25-year series of reference reviews of Code revisions published by the **National Electrical Manufacturers Association** now is available, according to NEMA's Engineering and Safety Regulation Department. The booklet was compiled by **H. P. Michener,** assistant manager of the NEMA department.

★ ★ ★

The National Electrical Code is the authority on electrical safety and a document that controls the installation of electrical equipment throughout the country. It is of prime importance to the electrical industry. Changes that occur in it affect contractors, inspectors, manufacturers and utilities alike.

★ ★ ★

All changes made in the former edition are detailed, eliminating

the need for Code users to make painstaking comparisons between the new and old documents. The intent is to show the nature of the changes which have occurred in the Code since the 1953 edition. Where the reason for the revision may not be obvious, a brief explanation is given.

★ ★ ★

The 45-page, 4¾ x 7 inch pamphlet is available at 25 cents a copy from the National Electrical Manufacturers Association, 155 East 44th Street, New York 17, N. Y.

Plastic Equipment Repair Demonstrated

During a talk on the role of plastic equipment in corrosion control, given before the St. Louis meeting of the National Association of Corrosion Engineers, **Thomas F. Anderson,** general manager of **Haveg Industries,** Pla-Tank Division, demonstrated the ease of repair possible with polyester glass reinforced plastic equipment.

★ ★ ★

Taking a piece of plastic fume duct, Anderson, with repeated blows from the heavy machines hammer, demonstrated that slight crazing can occur even though the piece does not fracture. He then proceeded to demonstrate how reinforced plastic equipment can be repaired in the field. Plastic fume handling systems can be repaired without removing them from service. In many cases plastic tanks and pipe can be similarly repaired with only the need for an initial application of quick hardening cement to control active leaking before the reinforced patch is applied. The reinforced patch and the cement takes on the characteristics of the original material, both chemically and physically, the strength being superior in many cases to the original section.

★ ★ ★

The general procedure in plastic repair is the sealing first of any leak with a quick setting cement, light sandpapering of the entire surface, mixing the catalyst and resin and finally applying the reinforcing material and resin to the joint. The job takes only a matter of minutes.

Workshop in Man-Management

For the third consecutive year, **Dunlap and Associates, Inc.,** management consultants, will be holding a man-management workshop in New York City starting January 31, 1957.

★ ★ ★

The Workshop consists of one 2-hour session per week, over a period of 10 weeks, during which there will be experiments, demonstrations, case and film discussions, illustrated lectures and success reports and other features.

It is designed for key executives and managers to bring about a better understanding of the problems of personnel management and train them for a fuller utilization of any company's existing and limited manpower resources. The course has been repeated 24 times so far in various cities.

★ ★ ★

For a program and application blank, write to **Dr. B. J. Covner,** Workshop Director, Dunlap & Associates, Inc., 429 Atlantic St., Stamford, Conn.

Standardize on ACROPAK* Spools!

Only ½ the Weight!

YET STRONG, TOUGH, RIGID . . *LONGER LIFE*

ACROPAK Spools will help you cut wire packaging costs because they give longer service, require less maintenance and cost less to ship. They're strong. They'll take repeated shippings and still run true on the arbor. They're machined to close tolerances. You can run them at high production speeds with fewer snags, less toe-out and minimum end breakage.

- Light Weight
- Precision built
- Reduced cost
- Longer life
- Extra strength
- Dynamic balance
- Greater production
- Low cost reconditioning
- Less maintenance
- Attractive packaging

THEY CUT YOUR SPOOLING COSTS

Best proof of ACROPAK superior performance are the millions of these spools now used by the biggest names in the wire industry. We've proved it to them—let us prove it to YOU.

★ We also make a complete line of heavy-duty shop processing STEEL SPOOLS built to the same high standards of accuracy and rigidity as the famous Acropak aluminum spools.

ACROMETAL PRODUCTS INC.
616 5th Street North, Minneapolis 1, Minn.

Page Aluminized Fence

A colorful and informative 4-page bulletin, designated DH-16, which should be of interest to plant executives and others charged with industrial, residential and institutional property protection has been issued by the **Page Steel and Wire Division, American Chain & Cable Co.,** Monessen, Pa. Numerous applications of Aluminized Fences as well as special features and styles are listed.

★ ★ ★

It details a modern addition to Page's fence line—Chain Link Fence of ACCO Aluminized Fabric and ACCO Aluminized Albarb Barbed Wire. The protective aluminum coating, which is bonded to steel wire, will not wash away as it oxidizes, but will remain for years of service where abnormal corrosive atmospheres may be present.

New Data Book and Price Schedule Issued by Techalloy

A new 28 page price schedule that marks a revolutionary step forward in the wire drawing industry has just been released by **Techalloy Company, Inc.,** Rahns, Pa. This price schedule also doubles as a reference data handbook.

★ ★ ★

As a price schedule, it gives prices, cutting extras, packaging and other information on wire, rod and strip of Monel, Nickel, Inconel, Ni-O-nel, Nickel-Clad Copper, Ni-Span C, Techalloy Electrical Resistance alloys and Techalloy Stainless Steels.

★ ★ ★

As a reference data handbook, it contains charts and tables on normal chemical analysis, mechanical and electrical and magnetic properties of Techalloy products. Useful reference data for production and design engineering as well as easy-to-use weight charts for wire, rod, strip and flat wire are also included. In addition, it lists the latest information on the Controls Material Plan affecting Nickel alloys.

★ ★ ★

Another feature is the double-page spread showing a perspective floor plan and plant layout drawing of Techalloy's new plant, a really modern wire, rod and strip mill.

★ ★ ★

Copies are available from the company.

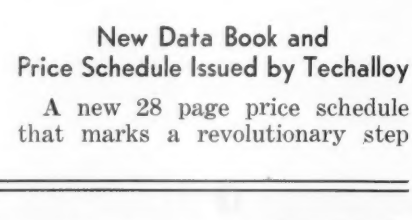
Bureau's Wiring Program in 1957

A commercial and institutional adequate wiring program, based on the facts learned through a recent market survey, is being prepared by the **National Adequate Wiring Bureau** for 1957. It will enlist the support of all branches of the electrical industry and furnish promotional materials necessary to help electrical utilities and contractors sell better wiring installations.

★ ★ ★

The need for a coordinated plan of this nature has been indicated for some time. That is why, in June, 1955, in anticipation of the added emphasis which residential wiring is now receiving, the sponsors of the National Adequate Wiring Bureau enlarged the Bur-

How to cut your wire handling time 4 TIMES or more...



Use Sheffield Manufacturer's Wire in the new

Sheffield KONE-PAK

Goodbye to the old method of packing small 100 to 2000 separate coils of wire in a carload! Sheffield puts the same amount in just 50 KONE-PAKS. And your unloading costs go down.

You'll save by having fewer units of wire to handle. Faster set-up for threading into machines. Fewer loadings. Less down time for changeovers. Scrap-ends loss reduced around 75%. Big cuts in labor costs. Wire snags reduced to a minimum.

For still more economy: Ask for the help of our metallurgists and wire specialists to be sure you get the exactly-right wire for your needs. Call your nearest Sheffield office.

Now! Rust-Protected

Every shipment of Sheffield Manufacturer's Wire is protected with special paper or pellets that release a rust- and corrosion-resistant vapor.

SHEFFIELD STEEL
DIVISION
ARMCO STEEL CORPORATION
SHEFFIELD PLANTS: HOUSTON • KANSAS CITY • TULSA

eau's scope to include the promotion of adequate wiring in commercial and institutional occupancies.

★ ★ ★

It is recognized that, while both utilities and contractors consider this field as a single market, it has a different approach from the residential market. There is little in common between such diversified structures as apartment houses, office buildings, gasoline service stations, super markets and restaurants, except that the owner is in business for profit. Even this is not true of schools, churches or hospitals. Electrical uses and therefore wiring needs, are extremely varied.

Cleaning of Air Treated in Bulletin

The subject of super cleaning ordinary atmospheric air by means of specially adapted industrial cloth-filter-type dust collectors is treated in a new bulletin just published by **Wheelabrator Corporation,** 1184 South Byrkit St., Mishawaka, Ind.

★ ★ ★

Ultra-filtration is applicable to the cleaning of cooling air for electrical motor and generator rooms, transformer rooms, control rooms, bus bar housings, telephone circuit rooms and other enclosures for heat generating electrical equipment, to laboratories requiring dust-free atmospheres, to precision manufacturing, to pressurizing enclosed working spaces in dusty areas and to diffuser plates and tubes in activated sludge sewage plants.

★ ★ ★

Free copies of this bulletin may be obtained from Wheelabrator Corporation. Ask for bulletin 557-D.

Plastic Liquid Prevents Yarn Fraying

Blaco Manufacturing Co., 6541 Euclid Ave., Cleveland 3, Ohio, has developed a special plastic liquid, designated as MAC-123, that is used as a coating over untreated cotton braid to prevent the fraying of the ends when the cable is cut to make a termination of the wire. Information will be supplied by the company upon request.

Bulletin Describes New Header

The Waterbury Farrel "Headmaster," said to be the world's fastest solid die double stroke cold header is shown and described in a new bulletin published by the **Waterbury Farrel Foundry & Machine Co.,** Waterbury, Conn.

★ ★ ★

The bulletin covers the various design features in this new machine which enable it to head rivet and screw blanks at unprecedented rates of 300 to 450 per minute.

★ ★ ★

The advantages of the toggle type construction used for actuating the heading gate are explained. The machine is illustrated and a table of specifications provided. A table showing the maximum and standard tool sizes for the "Headmaster" is included.

★ ★ ★

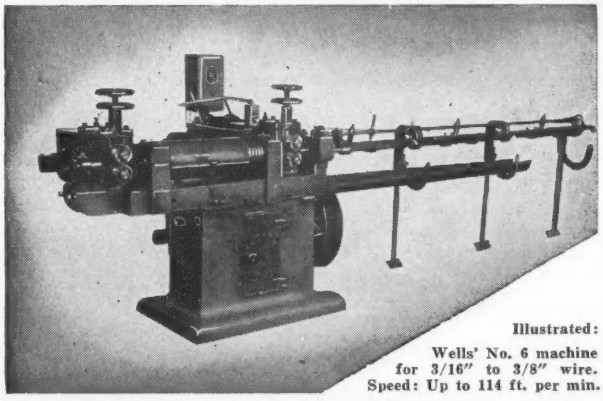
Free copies of this "Headmaster" bulletin are available on request from The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

Experience • Reputation • Workmanship

HAVE ALL COMBINED TO MAKE

WELLS STRAIGHTENERS & CUTTERS

NOTED FOR DEPENDABILITY SPEED AND ECONOMY



Illustrated: Wells' No. 6 machine for 3/16" to 3/8" wire. Speed: Up to 114 ft. per min.

WELLS MACHINES ARE PREFERRED WHERE CONTINUOUS HIGH PRODUCTION AND ACCURACY ARE FACTORS OF IMPORTANCE

TIME-TRIED TESTED & TRUE.

WELLS STRAIGHTENING AND CUTTING MACHINES have won the reputation of being highly dependable, with ability to stand up even on the most trying and difficult jobs. The satisfaction that our customers enjoy can be yours, if you equip your plant with WELLS machines.

The No. 6 model illustrated above will cut in lengths of 7½" to 25'. A full line of WELLS machines is built for all gauges of wire and straightening and cutting jobs.

Write for catalog showing all machines

Frank L. Wells Company

5821 FIFTH AVENUE • KENOSHA, WISCONSIN

Builders of Fine Wire Working Machinery

Refined metals consumed in mill products 1/ in 1955 and in 1956, by months, and stocks of refined copper at end of period, gross weight in short tons

Period	Consumption						Stocks of refined copper	
	Wire mills	Brass mills						
	Refined copper 2/	Refined copper 2/	Refined lead	Primary pig tin	Refined nickel	Slab zinc	Wire mills	Brass mills
1955 3/----	812,663	647,044	3,443	1,055	3,527	133,737	21,387	41,518
1956:								
January---	77,293	65,519	300	135	368	12,203	18,102	33,173
February--	71,838	63,703	345	138	411	11,680	18,900	34,268
March-----	82,678	60,542	329	128	368	11,884	17,875	40,272
April-----	81,871	60,035	291	112	366	11,800	20,737	42,233
May-------	82,270	58,625	246	95	342	11,381	23,586	45,274
June------	79,013	44,110	177	67	403	7,475	28,480	51,566
July------	45,301	31,771	115	56	319	4,578	51,686	58,738
August----	71,183	48,529	203	87	425	7,694	51,850	49,503
September-	67,635	43,515	191	(4)	(4)	7,498	50,668	43,501

1/ Data cover operations of 17 wire mills and 57 brass mills.
2/ Detailed information on consumption of refined copper is published in the Monthly Copper Report.
3/ Final figures.
4/ Not available.

WRITING TECHNICAL ARTICLES

AN INVITATION

YOU derive much benefit from the articles that appear in WIRE AND WIRE PRODUCTS and in turn might well share your knowledge with others in the Wire Industry. That helps to keep the industry progressive and prosperous. We are glad to pay for wire or wire product papers, but many authors prefer to contribute articles for the good of the industry. All such articles or papers contributed by members of THE WIRE ASSOCIATION are eligible for the Medal Award or Certificates of Honorable Mention.

Won't YOU help out by writing for WIRE AND WIRE PRODUCTS in 1957?

Write to the

EDITOR

WIRE AND WIRE PRODUCTS

453 MAIN STREET • STAMFORD, CONNECTICUT

ALUMINUM STATISTICS

PRIMARY ALUMINUM PRODUCTION
IN THE UNITED STATES
(in pounds)

1956		
September	264,631,718	
August	184,812,424	**
Total through September	2,473,299,931	
1955		
September	261,231,951	*
Total through September	2,313,383,788	*
All-time record month		
July 1956	303,248,010	
All-time record quarter		
2nd 1956	882,505,193	

* Revised from previous reports.

** Reflects loss of production due to strikes.

Completes Larger Plant in England

Completion by **National-Standard Company Ltd.**, of a 61,000-square-foot manufacturing facility at Kidderminster, England, was announced by this leading producer of specialty wire for industry.

★ ★ ★

A single-story, tubular steel frame and brick structure, it is almost half again as large as the leased facilities it is replacing at Kidderminster. The English subsidiary's new plant started with approximately 75 employees when it began operating in December, according to **John T. D. Spence**, managing director.

★ ★ ★

National-Standard has manufacturing facilities in six states and Canada, in addition to the English plant.

Manufacturers' Wire Handbook

A new 120-page Manufacturers' Wire Handbook featuring almost 100 types of steel wire is available free from **Pittsburgh Steel Company.**

★ ★ ★

The handbook, presented in an editorial format for greater readability, contains complete information on wire products made by Pittsburgh Steel Company and its subsidiary, **Johnson Steel & Wire Company** of Worcester, Mass.

★ ★ ★

Sections in the handbook are devoted to spring wire, ACSR core wire, strand wire, rope wire, high carbon specialties, shaped wire, wire for cold heading and cold forging, welding quality wire, wire for industry, mill practices and Johnson Steel's 21 different specialty wires. The latter range from aircraft cord wire to tire bead wire.

★ ★ ★

Each of the types of wire is individually described and data such as size range, weights, tensile strength and chemical composition is provided. Sixteen pages are devoted to table and a hardness conversion chart. A handy glossary describes technical and semi-technical terms used. For further information write the Company, 1825 Grant Building, Pittsburgh 22, Pa.

CHECK LIST FOR
PLYMKRAFT
IMPROVED CABLE FILLER
Samples supplied upon request
Made to fine tolerance
Always uniform
Available in put up that works best on user's equipment
Takes any type treatment—wax, jute saturant, anthracene
Made to user's specifications if desired
Backed by the Plymouth Cordage Company, makers of quality products since 1824
Write to: PLYMKRAFT DIVISION
Plymouth Cordage Company
Plymouth, Mass. • New Orleans, La.
Warwick, Va.
PLYMOUTH
1824

Automatic Coil Strapping

(*Continued from page* 1461)

this equipment you can apply two straps, four straps, six straps or eight straps and on and on in a sequence of two straps. With two Power Strapping Machines operating simultaneously, it puts the straps on twice as fast as our previous equipment. We can build this machine to handle coils of any size and can adapt the machine to the individual requirements of your mill. I'm glad to say that one of these machines can be seen operating at our Chicago plant, as we will be demonstrating the machine next week. We invite you all to see it. We will be showing this machine for possibly a month or so.

★ ★ ★

Some of you have asked for one type of equipment that we haven't been able to develop satisfactorily up to now. That is a baling press for strapping coils in bundles. We have done a lot of work on this project and are still working with several companies to develop equipment of this kind. Due to the wide range of sizes, this development becomes quite difficult. A machine of this kind also requires

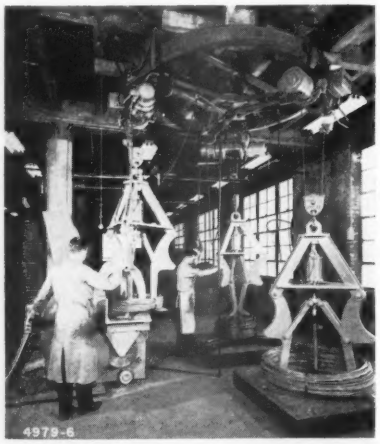


Fig. 5.—MH11-34 Automatic Power Strapping Machine. View showing early equipment for handling wire coils.

a great deal of flexibility due to the characteristics of the wire to be bundled.

★ ★ ★

There is, however, one more new machine which I think you will be interested in. We've all heard a lot of talk about automation and the automatic factory. Well, Signode has brought automation to the strapping of cartons of nails. The first step in the development of this machine was a semi-automatic power strapping machine for nail cartons. After further development, we produced a machine which handled nail cartons of various sizes and which strapped them automatically without requiring the continuous attention of an operator. Two of these machines are usually set up in tandem on the production line. When only one strap is needed, the second machine is used as a spare and is instantly available to take over the strapping operation whenever the first machine runs out of strapping or seals. Where cross straps are required, an attachment is put on the conveyor which rotates the carton through 90 degrees between the two machines so that two

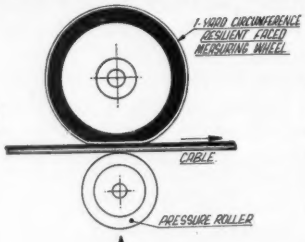
EXACTOR MEASURING MACHINES ARE USED BY THE BRITISH GENERAL POST OFFICE

ACTUAL SIZE OF COUNTER FIGURES

Patents: British 720,597
U.S.A. 2,706,857

THE 'EXACTOR' CABLE AND WIRE
Measuring Machine
Fitted with the Patented "Resilient-Faced" Measuring Wheel
Ensuring Even GREATER Accuracy Than Before!

LARGE CONTACT AREA— REDUCTION OF SLIP.



PLUS

Special ALBION 5-figure reset REVOLUTION COUNTER with ½ inch high numerals for quick and easy reading. Counter records in increments of 3 inches and yards and can be supplied as a *separate* item.

- Straightening device and compound removers fitted for cable.
- Elegant design—robustly built.
- Self-lubricating bushes and ball-races fitted — no manual lubrication necessary.

FOR ELECTRIC WIRES AND CABLES, WIRE ROPES AND ALL LENGTH MEASURING UP TO 1 INCH DIAMETER.

B. & F. CARTER & CO., Ltd. Bolton, England Telegrams: 'Braiders Bolton.'

ELECTRIC CABLE, BRAIDING AND WIRE ROPE MACHINERY OF EVERY DESCRIPTION

straps can be applied automatically.

★ ★ ★

We have now developed a further improvement to this machine which permits the straps to be applied always in the center of the carton, regardless of how large the carton is.

★ ★ ★

I'm afraid that I have passed over rather lightly what is perhaps the most important single fact about the development of this equipment. What is important is not so much that we have developed equipment which successfully applies straps in these various applications, but rather that we have developed equipment which is so reliable that it can successfully be used day in and day out in the production process of a steel mill. This achievement represents many hours of research and development engineering.

★ ★ ★

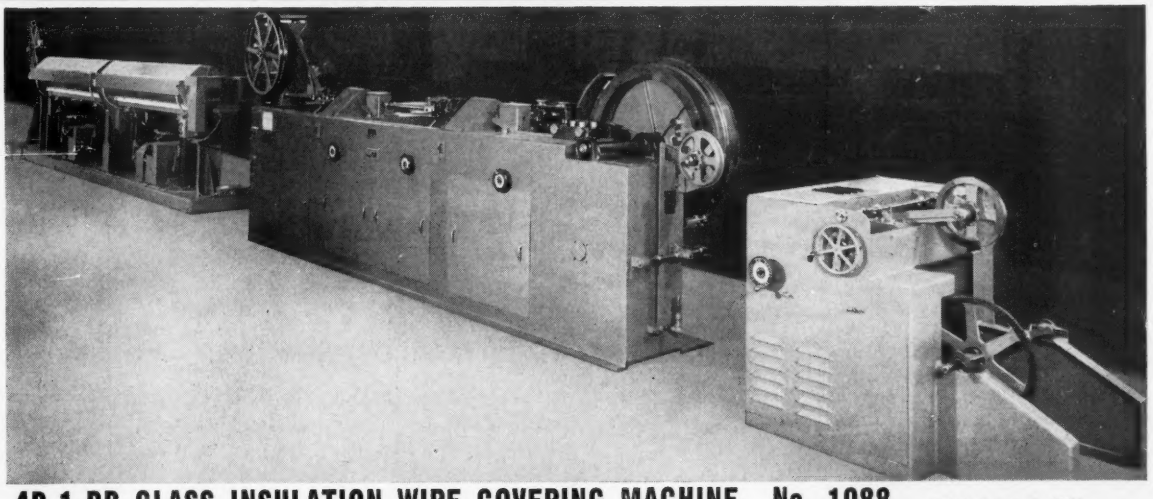
One of the reasons why these machines are practical and successful in the mill is that their design is carefully coordinated with the layout and design of your plant. The way it works is this. The Signode salesman tells you about some new equipment which we have available. If you are interested, he can show you literature, movies or perhaps can take you and some of your people to see an actual installation. If you are interested in having us study an application of this equipment in your plant, then our representative fills out a very complete report which will tell our engineers in Chicago the basic facts about your requirement. Then, one or more of our development engineers usually visit your plant to study your layout first hand and to work with your plant engineers and other interested people. Because our engineers have wide experience from previous installations on equipment of this kind, they can usually make valuable suggestions regarding the general layout and associated equipment.

★ ★ ★

Knowing the exact nature of your requirements, our engineers can set about to modify our standard machine in whatever way is necessary to take care of your specific problem.

★ ★ ★

When you are completely satisfied and the necessary details have been worked out, an order for the machine is placed and we produce it to your requirements. When the machine is ready for delivery, we send a competent field service man to your plant to assist in making the installation. He sees not only that the machine is properly installed, but also that the machine operators are properly instructed and that your Maintenance Department understands how the machine works and how to keep it in good operating condition. We are constantly stressing that our service men fully indoctrinate your maintenance people in a preventative maintenance program. He provides your people with a complete



4D-1-BB GLASS INSULATION WIRE COVERING MACHINE No. 1088 Patented Aug. 3, 1943

WITH VARIABLE SPEED DRIVE.
TORQUE MOTOR DRIVEN TAKE-UP REEL STAND
BALL AND ROLLER BEARING MOUNTED
BAKING OVEN WITH DOUBLE VARNISH APPLICATOR
AND AUTOMATIC TEMPERATURE CONTROLS.

WIRE DRAWING, ENAMELING, TINNING, INSULATING,
TAPING, GLASS-COVERING, PANNING AND ALLIED MACHINERY

EST. 1855 AIMCo INC. 1915
"American" INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.
FAIRHILL AND HUNTINGDON STREETS
PHILADELPHIA 33 PENNSYLVANIA U.S.A.

and detailed service and maintenance manual on the machine. Finally, we insist that our service men periodically return to your plant to check on the operation of these machines. A Signode man is available in any emergency and is always glad to help out.

★ ★ ★

We have some movies of some of these machines in operation which I am about to show you, covering three phases of the wire mill operation. The first is the large power strapping machine installation. This is our model MH11-TS-34 Automatic Power Strapping Machine. The other pictures show the small M-4 Strapping Machine. You will note that this can be used very effectively on smaller coils of wire. The third picture shows our new Automatic Power Strapping Machine for tying cartons of nails.

Snyder Joins Firth Sterling

The appointment of **Anthony J. Snyder** as Assistant to the Vice President—Sales, of **Firth Sterling, Inc.**, is announced by **Thomas G. Barnes**, Vice President—Sales. A veteran in the metal-cutting tool industry, Mr. Snyder was formerly Sales Manager of Motch & Merryweather Machinery Co. and Vice President and General Manager of the Morse Twist Drill & Machine Co. He also served as Chief of the Cutting Tool Section in the Metal Working Equipment Division of the National Production Authority, Washington, D. C.

★ ★ ★

Mr. Snyder started as an apprentice machinist at Morse, later being placed in charge of the physical laboratory there, during which time he worked on sales engineering in this country and Europe. From this position he rose to Works Manager, then to Vice President, and finally Vice President and General Manager.

★ ★ ★

LaSalle Steel Appointments

LaSalle Steel Company announces the following changes in its organization.

T. Lloyd Kelly became chairman of the board, **LaSalle Steel Company**, Chicago, Ill., effective November 1, 1956. He is a graduate of Cornell and started with LaSalle in 1921 advancing through numerous positions in both production and sales and was elected president in 1945.

★ ★ ★

Thomas A. Kelly, former executive vice president, has been elected president and chief operating officer. He is a graduate of Phillips Academy and Yale University, class of '43.

FOR A PHOTOGRAPH

of The Annual Luncheon of

The Wire Association in Pittsburgh

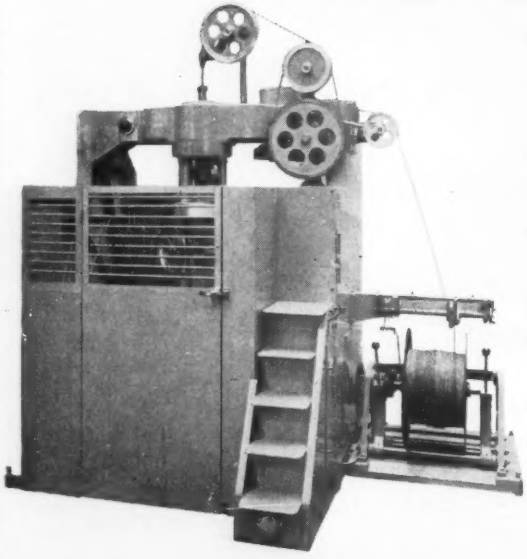
Write

LOU LITTLE

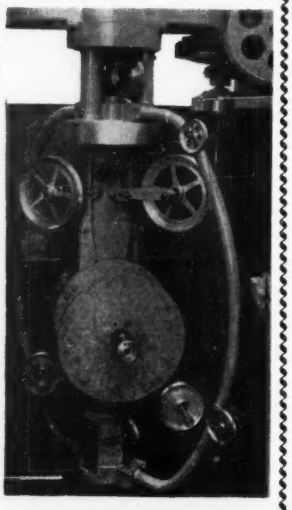
Club Floor, Penn-Sheraton Hotel

Pittsburgh, Pa.

SAME FRAME AS THE QUADDER ... HIGH SPEED TWINNER



- Specially built for plastic telephone cables, each wire insulated with strong or cellular polyethylene down to 26 Awg.
- Let-off drums up to 22".
- Production: 1000 lays per minute.
- Fully compensated and balanced wire tension.
- Right and left hand lays 1 to 7".
- Single or double take-up (maximum 30").
- Centralized lubrication.
- Lockheed brake.
- 10 Machines already running in the United States.



POURTIER MACHINES 153, rue Général Galliéni ROMAINVILLE (Seine) FRANCE

Norton Appointments

Several new appointments have been announced by **Norton Company,** Worcester, Mass., following the establishment of three new divisions on September 17th. **Theodore J. Englund** has become Manager of Industrial Engineering, **Paul L. Lantz** has been named Assistant Manager of Industrial Engineering, **William F. Watts** was given the new post of Factory Manager of the Refractories Division and **William P. Densmore** has been made Chief Industrial Engineer, a new position in the Refractories Division.

Keystone Promotions

William A. Sommer has been appointed Assistant General Superintendent of **Keystone Steel & Wire Co.,** Peoria, Ill., according to an announcement by A. H. Sommer, Vice President and General Superintendent.

★ ★ ★

Other appointments, which are promotions, are **John O. Tompkins** to Chief Metallurgist; **Delmar R. Bessler** to Assistant Chief Metallurgist; and **Louis Schoff** to Assistant Steel Mill Operating Metallurgist. These advancements followed the retirement of **Ray Simmons** last summer from the post of Chief Metallurgist, in which he had served for 20 years.

Production Manager Appointed by Firth-Loach

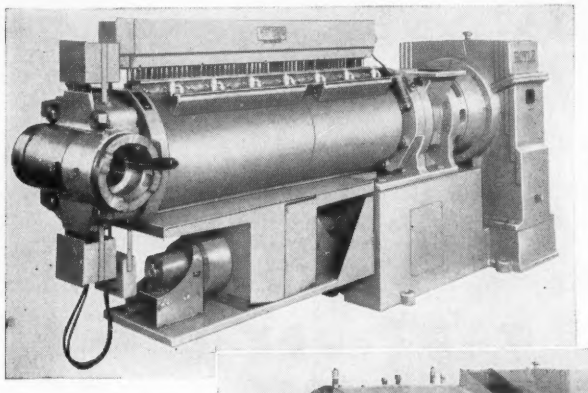
Robert C. Lindberg has been appointed Production Manager of **Firth-Loach Metals, Inc.,** McKeesport, Pa., it was announced by **William J. Loach,** President.

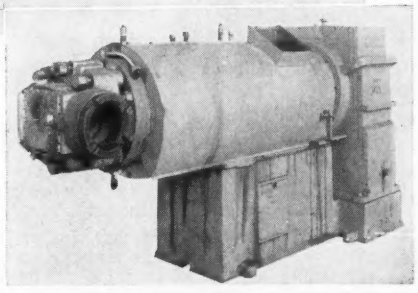
★ ★ ★

Mr. Lindberg who has been in the carbide field for 21 years, began his career in the Carbide Division of Firth-Sterling Steel Company in 1935. Starting in the mixing department, he was named Foreman in 1936 and was responsible for all powder stocks. As Technician in the Powdered Metal Department in 1942, he gained experience in all phases of production from raw powders to finished sintered products. Rising to Supervisor of Quality Control in 1951, he was placed in charge of development for the Carbide Production Department in 1952. He resigned in 1954 to join Firth-Loach Metals, Inc.

New Fenn Literature Describes Products and Facilities

The Fenn Manufacturing Co., leading producer of metal forming equipment, has published a new product and facilities folder to provide a quick over-all picture of the Company. The attractive two-color folder is profusely illustrated with pictures of the modern Fenn plant, metallurgical laboratory, manufacturing facilities and its standard and aircraft products. Text accompanying the pictures gives a brief description of each product. Copies are available by writing to The Fenn Manufacturing Co., Fenn Road, Newington, Conn.





8½" Spirod extruder with side delivery head for jacketing. Up-graded from circulating type shown to the right.

EVER THINK OF UP-GRADING TO SPIROD®?

Yes, it can be—and is being—done. And Royle's traditional approach to extruder development, the retention of features that have stood the test of time, makes it possible. The one-piece cylinder with built-in hopper is replaced by a separate cast steel hopper section, a cast steel cylinder with deep grooves that create fin-like separations for the rod type heating elements and the selective evaporative cooling equipment. Head and stock screw, as usual, are designed for process requirements.

If you are operating an older type Royle extruder you should investigate up-grading to Spirod—the electrically heated extruder with high velocity evaporative cooling—for maximum efficiency in controlled operating temperatures.

Write for Bulletin # 463

JOHN ROYLE & SONS ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

London, England — James Day (Machinery) Ltd. — Hyde Park 2430 - 0456

Home Office — V. M. Hovey J. W. VanRiper — SHerwood 2-8262

Akron, Ohio — J. C. Clinefelter — BLackstone 3-9222

Los Angeles, Cal. — H. M. Royal, Inc. — LUdlow 9-3261

Tokyo, Japan — Okura Trading Co., Ltd. — (56) 2130 - 2149

Engineering Data on Radiography

A new 12-page booklet titled "Norelco X-ray for Industry" containing operating and application data on six different types of radiography units, is available from the Instruments Division, **North American Philips Co., Inc.,** 750 South Fulton Ave., Mount Vernon, N. Y.

★ ★ ★

Instruments covered include: 60 Kvp lightweight portable radiographic-fluoroscopic unit, 160 Kvp dual-port unit, 160 Kvp 360 degree circumferential port unit, 150 Kv constant potential unit, 300 Kv constant potential unit, and 260 Kvp self-contained portable unit. Information is given also on industrail image intensifier and closed-circuit television installations.

★ ★ ★

The booklet shows photos and characteristics of all instruments listed and explains how they are used. There are three charts indicating the proper unit to use for various thicknesses of steel aluminum, the penetration values of different alloys and metals as compared to steel and the exposure data for steel.

Carbide Heading Dies Increase Production

A production increase of roughly 16 times, and bolts of better physical properties finished consistently to final size—that's what happened when Voi-Shan Mfg. Co., Culver City, Calif., switched to Carboloy cemented carbide dies in hot heading titanium aircraft bolts.

★ ★ ★

According to the company, which processes fasteners for both aircraft frames and jet engines, application of the carbide dies boosted production from 150 to better than 2500 bolts per hour by providing greater resistance to wear, and eliminating galling.

★ ★ ★

Although the company uses cold heading in upsetting its steel alloy bolts, all of its titanium and some of its stainless steel bolts in larger sizes are hot forged in order to obtain the maximum in physicals.

★ ★ ★

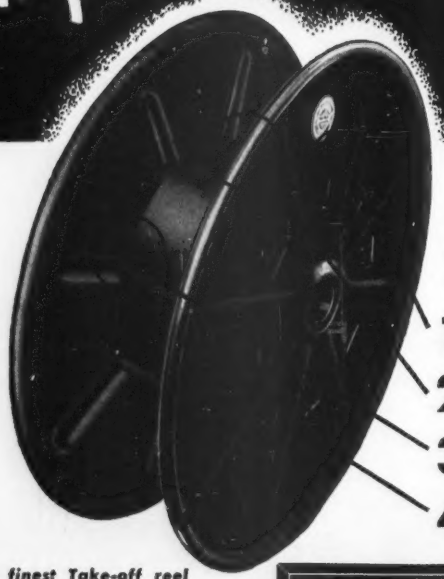
In hot heading, Voi-Shan uses titanium of the RC130 series. The material, in form of cut-off blanks, is placed in the coil of an induction heater and heated to around 1500° F for about 3 seconds. The die itself is not normally preheated.

★ ★ ★

Before shifting to carbide dies, the company reports, it experienced considerable difficulty with steel dies. Today, its special precision-built Carboloy grade 190 cemented carbide dies provide as many as 50,000 of the larger size bolts before any signs of wear show up. Steel dies wore after upsetting only 3000 bolts. The carbide dies perform even better on smaller diameter bolts, producing as many as 100,000 as against 5000 previously. In a 100,000 run, the carbide dies are removed about 10 times for repolishing.

Important DIFFERENCES

BETWEEN JUST ANY REEL AND All Welded MPS



TAKE-OFF REELS

Three important differences that mean longer reel life in both processing and handling of all types of insulated wires in your plant.

1. New MPS **deep wide, straight type embossed radial rib** adds considerable strength to reel heads over the old style narrow tapered rib.
2. **Increased height of the curled edge** adds even more strength and rigidity, especially to the rims.
3. Furnished with **rib fillers** that are projections on the end of the barrels that fit into the embossed radial ribs thereby **eliminating any marking of the plastic or rubber insulated wires** at the junction of head-barrel.
4. Finally, the **all welded "J" type construction** of the entire reel completes the picture.

The finest Take-off reel you can buy.
We invite your inquiries — let us tell you more about MPS Take-off Reels. Write us today.

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Massachusetts U. S. A.
Telephone Attleboro 1-0848

#109

Assigned Manufacturing Patent On Chromium Carbide

William W. Wellborn, Manager, New Products Research & Development, **Firth Sterling Inc.** has recently been granted U.S. patent number 2753621 covering the manufacture of chromium carbide grades CR-1 and CR-2, which he has assigned to Firth Sterling Inc.

★ ★ ★

This patent specifically covers a manufacturing technique and composition range resulting in finished compounds with exceptional characteristics important to the metalworking, chemical and food processing industries.

★ ★ ★

These characteristics are high hardness at room temperature as well as temperatures up to 2000° F., a coefficient of expansion relatively nearer that of steel than other cemented carbides, resistance to chemical attack over a wide range of temperatures and the ability to take an exceptionally fine finish which produces a significant reduction in its coefficient of friction.

★ ★ ★

Because of this combination of characteristics, these materials are extensively used for hot extrusion die inserts, trim for various chemical process valves, plastic molding dies, gauge blocks and plug gauges, rotary seal assemblies, parts for high temperature service in either oxidizing or reducing atmospheres and many other similar applications.

Catalog on Armored Cable

"Nepco-Lok Interlocked Armored Cable, Supports and Fittings" is the title of a catalog recently published by **National Electric Products Corp.,** Pittsburgh, for electrical engineers and contractors, architects, plant engineers and others who specify electrical systems for new and old electrical facilities.

★ ★ ★

The 24-page book contains photographs and specific descriptions of the various types of Nepco-Lok armored cables available for voltages up through 15,000 volts, single and multi-conductor.

★ ★ ★

Arranged in table form are correlated listings of the most frequently used dimensional data, including conductor size, stranding, insulation, sheath and armor thickness, approximate outer diameter and weight per thousand feet, together with the support system and fittings recommended for use with the cable.

★ ★ ★

Copies of the reference piece can be obtained by writing to the Advertising Department, National Electric Products Corp., Gateway Center, Pittsburgh 22, Pa.

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BUYER'S GUIDE

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EXTRA FLEXIBLE CONDUCTOR STRANDED OR BRAIDED

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BARE · TIN or LEAD COATED · SILVER PLATED

Special Heavy Tinned Conductors for Hook-up Wire

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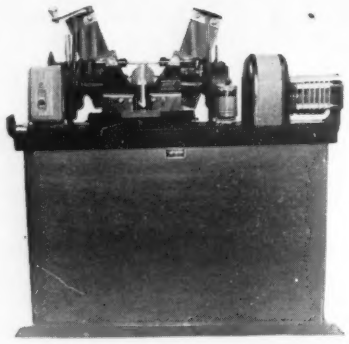
PROFITABLE STRIPPING

OF YOUR SCRAP AND REJECTED WIRE & CABLE IS GUARANTEED WHEN YOU HAVE THE RIGHT MACHINE ON THE JOB.



Many of our machines have been in service up to 10 years. Our later MODEL "526" (pictured), with a capacity of 5/16" to 6", is now the accepted leader in the scrap and salvage trade. Strips short or long lengths, or off the reel.

For FAST and CLEAN CUTTING, in most cases actually taking the cable apart. No other machine can match the patented cutting action of the "526".

SAVES ALL RUBBER, PLASTIC, LEAD, COPPER AND ALUMINUM

Several models available for small or special work and plastic tubing.

Detailed information available—ask for it

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A Request to the Wire Industry

We are now correcting listings for the

1957 WIRE & WIRE PRODUCTS BUYERS' GUIDE

All manufacturers of rod, bar, wire and equipment or supplies should be correctly listed for the guidance of your customers.

Will you help us by checking your present listings and giving us any corrections, additions or deletions that should be made?

This is as important to you as to us. Please write

Editor

WIRE AND WIRE PRODUCTS

453 MAIN STREET

STAMFORD • CONN.

National Electrical Week Coming

(*Continued from page* 1463)

work television and radio, others that have announced plans to participate in the observance include: **Anaconda Wire & Cable Co.; Apex Electrical Mfg. Co.; Bulldog Electric Products Co.; Cavalier Corp.; A. B. Chance Co.; Crosley and Bendix Divisions, Avco Mfg. Corporation; Crouse-Hinds Co.; Duncan Electric Mfg. Co.; Emerson Electric Mfg. Co.; Frigidaire Division, General Motors Corp.; Hotpoint Co., Division of General Electric; Kelvinator Division, American Motors Corp.; Metalcraft Products Co.; Motorola, Inc.; National Electrical Contractors Association; Okonite Company; Owens-Corning Fiberglas Corp.; Penn Controls, Inc.; Pennsylvania Transformer Co.; Philco Corp.; Radio Receptor Co., Inc.; Smoot-Holman Co.; Steelduct Co.; Sunbeam Corp.; Triangle Conduit & Cable Co.; Waring Products Corp.; Western Union Telegraph Co.;** and **Whirlpool-Seeger Corp.**

★ ★ ★

Along with featuring the Week in advertising, many of these companies intend to participate in other ways. These activities will include open houses and plant tours, special features in house organs, executive speeches before service clubs and other groups, use of display materials, and tie-in publicity.

★ ★ ★

Although the program materials have not yet gone out, electrical leagues, power suppliers, inspectors, contractors, distributors, dealers, manufacturers and other industry groups have been alerted to the Week by means of convention talks, bulletins and trade press articles.

★ ★ ★

As a result, National Electrical Week committees have already been organized in many cities and are moving ahead in their planning, Skinner said. He cited as examples Boston, Cincinnati, Detroit, St. Louis, Washington, D. C., and the State of Rhode Island. The major feature of the Cincinnati observance will be an Electrical Progress Exposition.

The sponsors of National Electrical Week include: Air-Conditioning and Refrigeration Institute, American Home Laundry Manufacturers Association, American Home Lighting Institute, Edison Electric Institute, International Association of Electrical Inspectors, International Association of Electrical Leagues, International Brotherhood of Electrical Workers, National Appliance and Radio-TV Dealers Association, National Association of Electrical Distributors, National Electrical Contractors Association, National Electrical Manufacturers Association, National Industrial Service Association.

★ ★ ★

In addition, the following organizations have endorsed the program: American Institute of Electrical Engineers, Association of Electronic Parts & Equipment Manufacturers, Inter-Industry Farm Electric Utilization Council, International Association of Fire Chiefs, National Alliance of Television & Electronic Service Associations, National Association of Radio & TV Broadcasters, Operation Home Improvement and The National Grange.

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PENN-SHERATON HOTEL

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DRAWING COMPOUNDS

Over thirty years of successful experience with leading wire manufacturers provide the greatest assurance of better production with PERMAG wire drawing compounds.

Formulated in the Magnuson laboratories for guaranteed peak performance, PERMAG compounds consistently prove themselves ideal for all types of wire drawing, for both production and economy.

FOR WIRE CLEANING, too, PERMAG offers a group of completely tested formulas that will eliminate pickling trouble and speed drawing production.

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PRODUCTS CORPORATION

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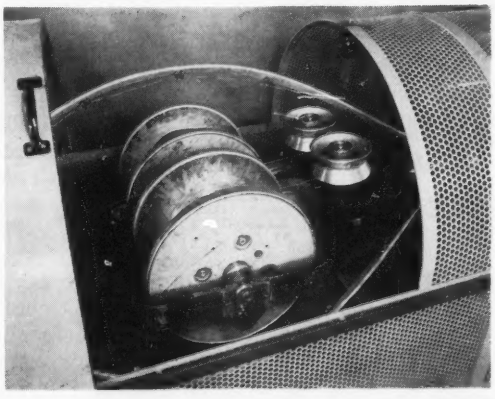
In Canada: Canadian PERMAG Products, Ltd., Montreal

TWO-WIRE DOUBLE TWIST CONSTANT TENSION TWISTING MACHINE



Designed and built for the uniform twisting of finer wires as small as No. 26 gage.

Tension control is combined with over run prevention and slow acceleration to permit the use of large reels and long lengths of small diameter wires.

Speeds up to 2280 lays per minute.

Reel sizes up to 24 inches diameter and 9¼ inches overall width or 19 inches diameter and 13½ inches overall width.

These machines are very efficient high speed units.

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Double your Refinished Tungsten Carbide Die Production

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DYKREX
"IT CORRECTS THE DIE"

Polishing Machine

It's factory assembled—just plug it in to nearest electric outlet.

ROOS TOOL & MFG. DIVISION
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Wire Die Finishing Machinery

33 Bloomfield Avenue
Newark 4, N. J.

Western Union
Teletype Service
QAB-WUX—Montclair, N. J.

The Standard of the Wire Industry

The Control of Insulated Wire Diameter

(*Continued from page* 1455)

9. Cycling or hunting of the stock-screw or capstan drive at certain speeds
10. Tool design, etc.

★ ★ ★

The effect these improperly functioning components have on the covered conductor may not be readily apparent to the naked eye or to an occasional hand-diameter measurement. Unless the covered conductor is of obvious sub-standard quality, there may be a tendency to let the condition of the tuber remain unchanged as long as it is producing passable wire.

★ ★ ★

By utilizing the graphic recorder attached to the gauge output, we can trace a continuous picture of the covered conductor's over-all diameter. (See Fig. 4)

★ ★ ★

This will give an idea how the over-all diameter was fluctuating prior to any evaluation of the various tuber components. Careful scrutiny of the tuber and a thorough analysis of the cycles on the graph will assist in locating the faulty operating component. The results of repairing the component can then be evaluated by making a re-run of exactly the same type wire and then checking the recorder graph to see if the cycles have been eliminated or, at least, greatly minimized.

★ ★ ★

The components of the tuber must be evaluated before any real benefits can be realized from use of the automatic controls. Remember that the control is limited to the correction of long-term cycles and drift. Therefore, if a faulty tuber component is causing short-term cycles which are outside the operating limits of the control, there can be no really effective correction.

★ ★ ★

Now, let's take the case of a faulty brake on the pay-off stand that was causing the wire to whip as it entered the extruder's head. The slipping brake also accentuated the whipping caused by the bare conductor sliding back and forth over the top of the pay-off reel. (See Fig. 5)

Handwriting of a man about to discover

the secret of cutting, forming, and grinding metals at top rates . . . with fewer rejects and longer tool, die, and abrasive life. You too will benefit from the modern compounds developed by specialists with 23 years of engineering and manufacturing experience. What's more, you'll like the friendly, cooperative approach that Bick engineers take in solving lubricant problems. To get the most out of your machines, always call Hans C. Bick to smooth and cool the way.

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READING, PENNSYLVANIA

Six *advantages from just* One *dip!*

coat with

BORAX 5 MOL.

Here are the advantages you get when your stock is Borax-coated...

1. GOOD ACID NEUTRALIZING
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6. RUST DOES NOT FORM

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By looking at the graph, one can see how the over-all diameter fluctuated at the beginning of the run when the pay-off reel was relatively full. We used a 63" reel which held about 3,000 pounds of aluminum. Note what happened to the over-all diameter after one half of the reel's capacity had been removed. (See Fig. 6)

★ ★ ★

At this point, the reel held approximately 1,400 pounds of bare conductor. The faulty tension brake is now able to contend with this smaller weight and slippage is minimized. This provides for a more even, constant tension at the input side of the extruder. Also, since the outside diameter of the reel is much smaller, there is less whipping caused by the bare conductor sliding back and forth over the top of the reel. All of these factors contribute in restraining the over-all diameter from straying too far from nominal.

★ ★ ★

By computing the weight of the plastic consumed, it can be illustrated graphically how the automatic control gives the manufacturer a considerable economic advantage. Since the product is effectively controlled, the diameter of the covered conductor can be produced at, or close to, nominal. For example: (See Fig. 7)

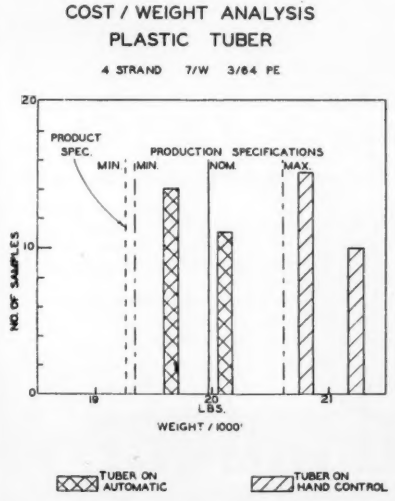

Fig. 7—Comparison of diameter with automatic versus hand control, #4, AWG, 3/64" wall. *

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Turns Your Waste into Profit!

BLEEDER STOCK
CABLE STRIPPINGS
AND CUTTINGS—
Reprocessed To Original Extrudability

Thermoplastics Restored
FOR REUSE IN JACKETINGS AND INSULATIONS

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IN MEETING THE REQUIREMENTS OF
THESE SPECIFICATIONS, IT MAY PAY YOU

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MANUFACTURERS OF VINYL COMPOUNDS

FOR SPECIFIC END USES UP TO 125° C.

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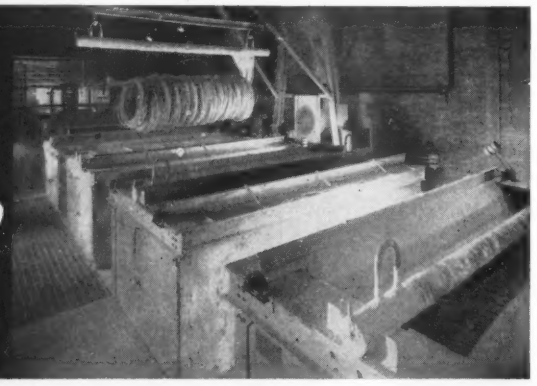
ROD BAKERS



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OTHER PRODUCTS: Core Ovens • Mold Ovens • Welding Rod Ovens • Heat Treating Ovens & Furnaces • Special Processing Equipment and Accessories.

On a conductor size of #4 AWG with a 3/64″ wall of polyethylene, 1 to 1.5 pounds of plastic covering material is saved on every 1,000-foot length produced by the tuber. In this case, 25 samples were taken under each condition—with the tuber on "automatic" and on "manual" control. The graph indicates that when on "manual" operation, there is a definite tendency to run the covered conductor heavy to make certain the over-all diameter stays above minimum.

★ ★ ★

This is further illustrated by using size #2 AWG covered with a 3/64″ wall of polyethylene as an example. (See Fig. 8)

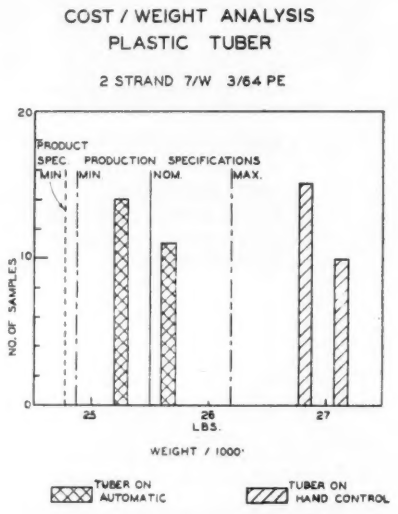

Fig. 8—Comparison of diameter with automatic versus hand control, #2 AWG, 3/64″ wall.

Here, the economic advantage of the control is more pronounced. The control decreases the amount of plastic required by 1 to almost 2 pounds on every 1,000-foot length produced. On a 100,000-foot run, this would represent a saving of 100 to 200 pounds of plastic.

★ ★ ★

Another benefit derived from automatic diameter control is improved labor efficiency. While it cannot be readily measured in dollars and cents, it can be felt and seen. The visible effects are better housekeeping and less downtime. The operator, being relieved of

frequent micrometer checks, can prepare his work better, assist in material movement, and maintain cleanliness and order about his equipment area. This is a somewhat intangible form of savings reflected principally in appearance and operator attitude.

★ ★ ★

Another application of this unit which shows considerable promise is in the development of extruder tip and die designs. Past tool designs have tended to follow the "cut and try" method. By utilizing the measuring and recording portion of the instrument only, a standard pattern of variation can be established for a given die design with all other variables fixed. By substituting alternate designs of dies, with all other variables remaining constant, the normal variation of dimension can quickly be established together with changes in rate of put through, power demands, etc. While only preliminary work has been completed to date, this approach appears to offer real progress as an aid to the extrusion tool design.

★ ★ ★

The authors wish to express their appreciation to Mr. Harold Hearing of the Kaiser Newark Works Rubber Laboratory for his valuable assistance in selecting and preparing case histories for inclusion in this report.

Booklet on Tumbling Barrels and Abrasives

"Barrel-Finishing with Norton Tumblex Abrasives" is the title of a completely revised 76 page booklet being offered by **Norton Company** of Worcester 6, Mass. The booklet includes information on types of barrels, selection of abrasive, cleaners, time cycles, and other important facts about barrel-finishing. It includes before and after photographs and case histories of actual examples of deburring, finishing for plating, and precision forming of radii to blueprint specifications. When writing, ask for Form 501.

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It pays—send for rates
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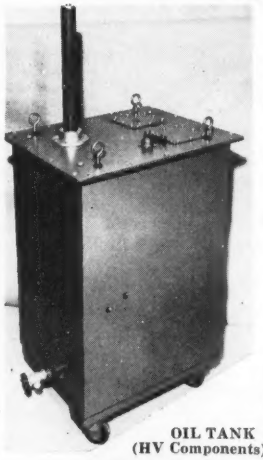
100 KV DC TEST SET (Overpotential Testing)
For Non-Destructive Insulation Testing of Sample, or Full Reel Tank Testing.



OIL TANK
(HV Components)

1. Con. var., 0-100 KV output voltage.
2. Adequate cap. for rapidly charging full reels.
3. Automatic output shorting.
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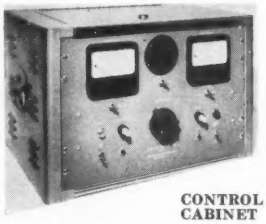

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Available in other ranges, from 5 KV to 200 KV.

Also, a complete line of Test Equipment for any required test on wire and cable, per IPCEA, NEMA, MIL, JAN, USAF, ASTM, and all other standards.

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A RUGGED, DEPENDABLE
Wire Measuring Machine
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Wire is easily "loaded" into measuring machine from the side or the rear without having to feed through guide bushings. Brake stops measuring wheel instantly when wire leaves measuring rolls. Predetermined units will automatically stop wire at desired length. Very accurate speeds to 2500 ft. per minute.

MODEL "L-25"
Capacity .030 to 1 in. Tachometer to govern rate of speed is optional.

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Value • Service • Economy

For this you pay a little more in first cost, but you save in faster work, in superior die finish and in better wire drawn. DANFORTH POWDERS are uniform in purity, quality, grain shape and accuracy of grading.

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The DANFORTH PROCESS of reclaiming produces powders that are *guaranteed* to be 99% or better pure.

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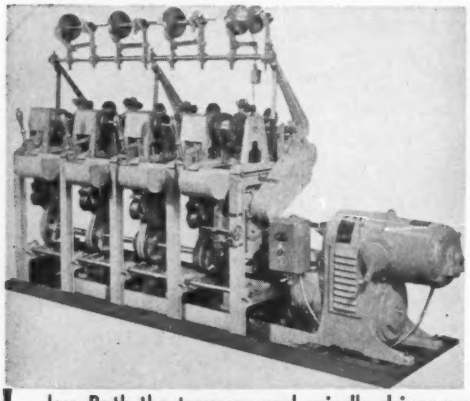

1900-HV MULTIPLE SPINDLE SPOOLER

SPECIFICATIONS
Size Range: .010" to .080" or heavier if soft and many flat wire sizes.
Max. Spool Size: 16" flange diameter.
Capacity: usually 4 to 8 spindles.

The 1900-HV Spooler is a rigid, precision machine which will consistently produce a uniform, dense wire lay. Both the traverse and spindle drives are regulated through wide-range, stepless, variable speed units, eliminating change gears. The 1900-HV is completely adaptable to your particular constant or changing demands. All controls are positive. Adjustments are made accurately with the spooler in operation and without tools.

Both smooth acceleration and rapid stopping is obtained through a single lever at each station. Spool changing is simple and rapid. Anti-friction bearings are used on all shafting and spindles.

Your special requirements can be incorporated into the design. Each machine is delivered ready for operation from your power supply. Payoff stands furnished as extras.

Consult us on your spooling problems.

ROBERT J. EMORY COMPANY

31 East Runyon Street Newark 5, N. J.

Industrial Diamonds in the Wire Mill

(*Continued from page* 1445)

high polishing of carbide. Boron carbide can be effective in the heavier range of sizes, from 600 and coarser, which are the meshes used for coarse work, because in those sizes it has adequate strength to abrade tungsten carbide before the particles break down. Polishing must be done with particles finer than 600 mesh, and in such fine ranges man-made abrasives produce virtually nothing before breaking down to useless dust. The diamond is the only material with enough strength in fine particles to yield a high polish on tungsten carbide.

★ ★ ★

Between ripping, where baser abrasives are generally used, and polishing, where diamond powder is always used, is an operation variously called semi-polishing, pre-polishing or smoothening, where some die departments use diamond powder and some do not. We have experimented at some length on this operation and our conclusions run toward diamond powder. On dies up to 1/4" the smoothening operation with a USBS #15 diamond powder produces a good enough finish so that most wire mill die rooms would accept the die as polished. The use of boron carbide results in a smooth dull finish, necessitating an additional hand operation with USBS #9 diamond powder. If a die room finds the #15 finish unacceptable, thus demanding the high-polish operation in any event, the chances are that such a die room will have arrived at the same conclusion as we, that it is still economical to semi-polish with diamond in the smaller range of carbide dies, strictly on the basis of labor saving versus material cost. On larger dies, the decision is based on repetitiveness. If the job at hand is to semi-polish, let us say, 20 dies, all to finish 1/2", multiple automatic semi-polishing with boron carbide will represent a saving. When the operation, as is more common, calls for the semi-polishing of one or two of each of a variety of sizes, perhaps with a variety of contours, then a

succession of diamond powder grades more than pays for itself in time saved.

* * *

All of the conclusions on diamond cost versus economies in labor cost, have been based on there being a known charge for each carat of diamond powder. If a die room is using pre-mixed diamond compound, where most suppliers refuse to reveal the diamond powder content per gram of compound, the cost of the diamond powder is not known and there can be quite some variation in result. We at Union Wire Die do publish the concentrations in the diamond compound we manufacture and show that our diamond powder in compound form costs the purchaser just slightly more than if he bought dry diamond powder by the carat and mixed it himself. The steady growth in the use of diamond compound has resulted from advantages which neutralize a slightly higher diamond powder cost, especially in mills with moderate requirements, but these advantages cannot carry an extremely inflated charge for the actual diamond. Some of these advantages are the time-saving and convenience of having the mixing already done, the distinctive color for each grade to prevent misuse, and the uniformity of viscosity. In the final analysis, however, it is the diamond powder which is being bought and which does the cutting; therefore the user of diamond compound who does not know the amount of diamond he is getting should periodically check his costs per die or per mil with care against dry diamond powder mixed in the die room or against compounds which do certify the diamond content.

* * *

A question that frequently arises is whether there is a difference in cutting ability between diamonds from different countries or mines. For many years industrial diamond users subscribed to the belief that there is a distinct difference in hardness between diamonds of various origins; it was said that of stones available

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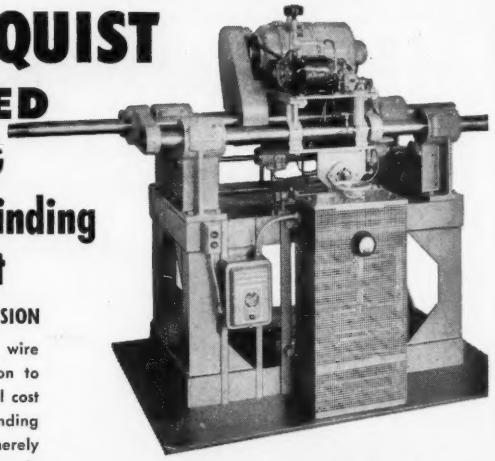

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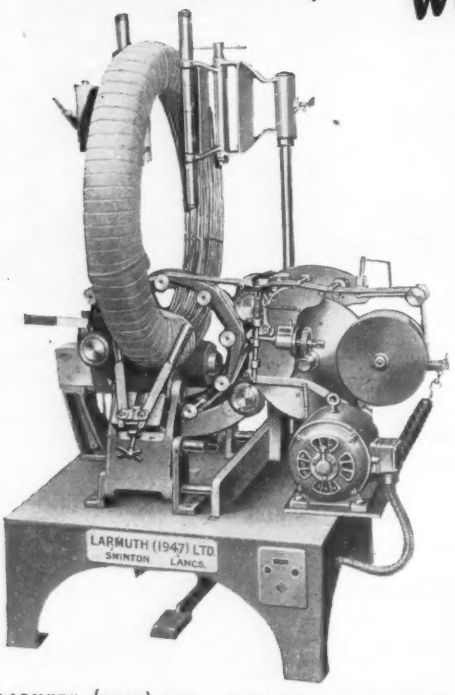

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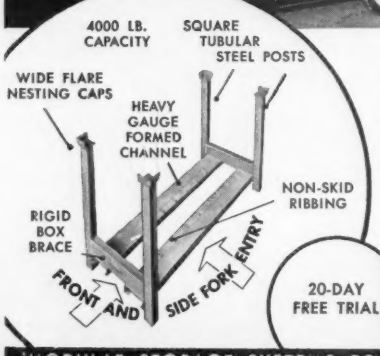

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in any quantity those from the Bahia district of Brazil are the hardest and the output of the Belgian Congo the softest. Present day belief discards these conclusions. The diamond is made up of carbon atoms, arranged in a symmetrical order, with each atom bound to the four nearest to it, and with the predominant crystalline habit being the octahedron. It it well-known that, hard as diamonds are, they can be cleaved easily when force is applied parallel to the cleavage plane. This is believed to be a consequence of imperfect bonding of the crystalline planes in the direction of the octahedron face. The directions in which the crystals are most widely spaced and the atoms have the smallest number of valence bonds give the least resistance to cleaving forces. When diamonds are used industrially, this same cleaving off occurs in work, so that w e a r o f diamonds results from the tearing off of crystals either singly or in clusters along the planes of atomic bonding. Most scientific writers on this subject agree that hardness is the same in all diamond crystals, and that what is commonly known as soft is meant a lack of cohesiveness of the crystal aggregate. Belgian Congo whole diamonds characteristically possess surface and internal weaknesses (such as slip planes on the skin, twinned planes, parting planes, knots, etc.) which serve as focal points for accelerated crystalline wear when the stones are used in their natural whole state, and which makes such diamonds superficially appear to be softer. Admittedly, these conditions do make Congo whole stones in their natural state undesirable for, let us say, die stones. However, crushing the diamonds to powder completely eliminates the previous weaknesses, and extensive tests have proven that there is no discernible difference in result with powders made from boarts of different origins. The basic equality of hardness of all diamond crystals asserts itself once the tendency to cleave off w h i c h may have existed in the original diamond is dissipated by the crushing.

* * *

Another question that is often raised is whether reclaimed diamond powder does as good a job as virgin power. Belief varies from reclaimed powder being just as good as new powder to a rejection of its use because it is never pure and because the cutting edges have been rounded off. The truth is somewhere in between. As for impurity, this may have been true in the past, but nowadays competent reclaimers can produce extremely high diamond contents, equal to that of new diamond powder. With regard to rounding of particles, it does occur in work and the extent of it depends on the application in which the original powder was used. We at Union Wire Die have had the opportunity to examine microscopically thousands of batches of powders we reclaimed for wire mill die rooms, where we knew exactly in what operation the diamond had been initially used. We have drawn these conclusions: If the powder was employed in recutting diamond dies, the action of diamond against diamond impelled by steel pins rounds the particles considerably. If the reclaimed powder comes from cotton or wood used in polishing carbides, the diamond particles tend to imbed themselves in the soft carrying material and preserve their edges. Use of diamond powder on carbides with steel pins wears the particles slightly, but more often the particles break; this continues to yield sharp particles but the reclaimed powder is in grades finer than those originally used. By and large, then, there is often a loss of efficiency with the use of reclaimed powder, but unless virgin diamond powder drops sharply in price, the saving of diamond-bearing waste in the wire mill, for eventual reclamation of the diamond, is a necessary money-saver.

★ ★ ★

Before leaving the subject of diamond as an abrasive, mention must be made of the use of pieces of whole diamond for cutting, or so-called "chipping," of tungsten carbide. Where a large amount of stock must be removed in an accessible working area, the use of

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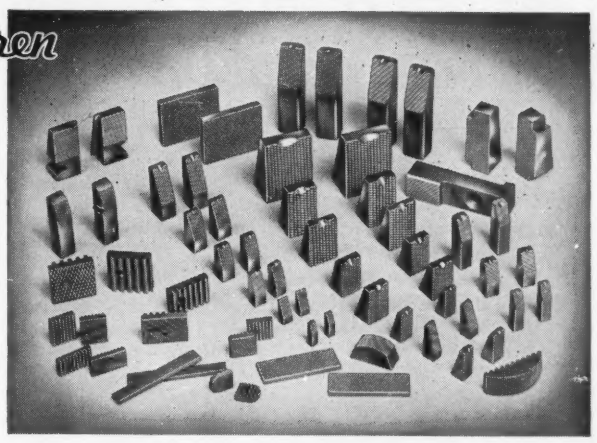

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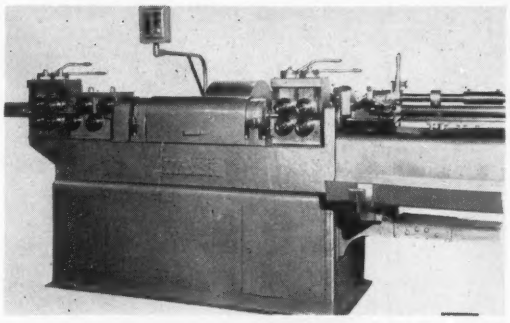

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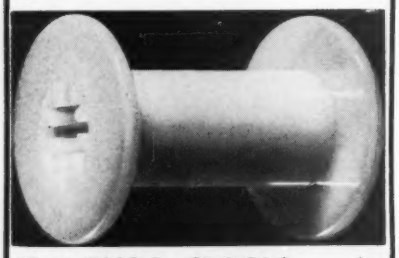

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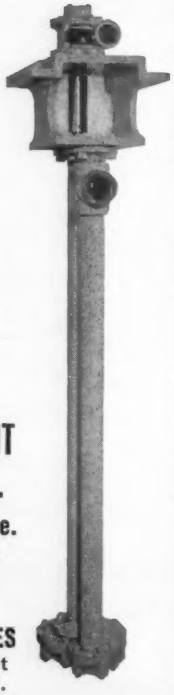

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whole diamonds securely held in pliers mounted on a tool post is recommended. It is vital that the portion of the diamond exposed to the carbide forms a good cutting edge, as otherwise there will be rubbing but no cutting action. The finish on carbide which has been chipped with diamonds is often rough and grooved; in that case the carbide work piece must be smoothened by a diamond wheel or coarse diamond powder before lapping can begin.

★ ★ ★

It is only recently that diamond powder has really taken hold and proved itself against lower first-cost products; the diamond die has had this same job to do over the past two decades, and did it successfully. The use of diamond dies in wire-drawing is now close to one century old, and there have been several swings of the pendulum over the years in the importance of diamond dies in drawing wire. When tungsten carbide dies first gained wide acceptance it was thought that diamond dies were doomed except for very fine sizes. In time, more accurate appraisals emerged of what carbide dies could and could not do. While this in no sense detracts from the carbide die and the revolution in wire-drawing which it engendered, it did not take wire men too long to realize that they had written off the diamond die too hastily. There then came a number of external developments which gave to diamond dies an opportunity to prove their value for still greater expansion of their use.

★ ★ ★

These developments were:

1. The increased speed of drawing in the non-ferrous field. This made whole string-ups of diamond dies essential, involving the use of diamond dies in large sizes that had been thought irretrievably lost to carbide.

2. The increased speed of drawing of ferrous wires, which ran carbide finishers over in size too quickly for economical attainment of precise size and finish.

3. In general, the insistent demands on wire mills for better finishes and closer tolerances.

4. The vastly expanded production of fine stainless steel wire.

5. The tremendous increase in the use of electricity and electrical appliances (including the telephone) which resulted in a great expansion in the drawing of non-ferrous fine wire.

6. The development of new hard al-

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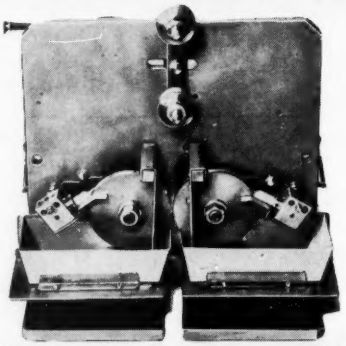

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loys to be drawn as a concomitant of technological advances in scientific fields.

7. The steady rise in the cost of labor and general overhead, which made down time too costly.

★ ★ ★

This is not to say that today every wire mill has the identical practice on when to use diamond dies and when to use carbide dies. Speed of drawing, type and condition of the drawing machines, finish and tolerance demanded by the customer, these and many other factors result in variation of procedure from wire mill to wire mill. Generally speaking, however, practice is well-determined and the outlook is for a high level of diamond die utilization Substantially increased use of diamond dies will probably not come from encroachments on tungsten carbide dies but rather will be a function of the level of the economy of our country.

★ ★ ★

The manufacturers of diamond dies in the United States are a group of small business men, rugged individualists all, who evolve for themselves on an individual basis the standards of weight and shape of the diamond used in the die, the metal in which the diamond is mounted, the die contour, and most of the other salient features of the diamond die. The remarkable thing is that despite the absence of industry-wide standards for diamond dies, there has developed a considerable uniformity of practice. The principal reason why this is not incorporated into a standard, perhaps drawing on some of the excellent diamond die specifications put out by a number of wire mills, is that old bugaboo of carat weight of the diamond in proportion to the die size. Some years ago there was a meeting of about a dozen diamond die manufacturers to work out a specification which could be adopted as a Commercial Standard by the U. S. Bureau of Standards. A list of minimum diamond weights per various hole sizes was an integral feature of the proposed Standard, but how to control the quality of the diamond? The diamond is a natural substance, unlike tungsten carbide nibs which can be manufactured to absolute specifications.

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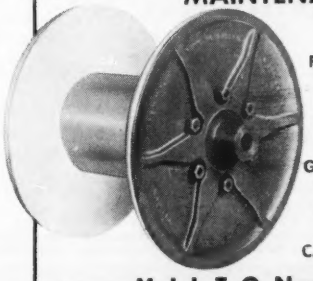

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It is all very well to write a diamond die specification calling for the use of "clear diamonds, free from flaws, and of regular shape, etc." but any diamond man will agree that even within the range of diamonds that fits such a description there is a broad variation of quality possible. The meeting finally ended inconclusively over the fact that if a diamond die manufacturer was entitled to certify that his dies conformed with the USBS standard because of the size diamond used, irrespective of quality, this would be unfair to the manufacturer using a more costly diamond of the same weight but having no different USBS certification to justify the higher price which the die would have to command. Just four months ago there was an article in Wire and Wire Products proposing weights of diamonds for various die diameters. However the author of the article made clear that the best guarantee of diamond die quality is not the specification of arbitrary stone sizes but the proven quality and integrity of the diamond die supplier. The wire industry can make a tremendous contribution to diamond die quality by a willingness to pay a fair price for a good die and disregard competitive price cutting.

★ ★ ★

Year by year the wire industry is enlarging its use of diamonds, and so wire men are justified in asking the status of diamond supplies; are we likely to be subject to shortages such as occurred during and after the Korean conflict or can we count on a steady flow of diamonds to meet our expanding needs? Throughout the period since the end of World War II the United States government has been laying in a heavy stock-pile of industrial diamonds, buying huge quantities of all types both directly from the Syndicate and via barter transactions with American dealers. During the first years of this span the stock-piling took surplus only and affected general supply and prices very little. As consumption of industrial diamonds continued to grow, so did production of diamonds, so the stockpiling continued to have only marginal effects. Then

about five years ago the use of industrial diamonds, especially boarts, surged upwards, which resulted in some scarcities and a sharp price rise. In time this condition was overcome by increased supplies and for some years there has been a good relative balance of supply and demand. As of this moment the government has discontinued stock-piling, but demand by industry has grown still further, apparently consuming the amount formerly going into government vaults.

★ ★ ★

With respect to the two types of industrial diamonds which principally interest the wire industry—boarts and die stones—the supply outlook is favorable. The boarts situation revolves about the Belgian Congo mines, and this picture is heartened by the continuously enlarging production there, from 6 million carats in 1946 to 13 million carats in 1955. This increase in production is particularly significant to industrial users since almost 96% of the Belgian Congo diamonds are industrials, by far the highest industrial and lowest gem yield of any important diamond area. Die stones emanate to a great extent from mines which produce a high percentage of gem diamonds, and here too the situation is one of expanding production. French Equatorial Africa has increased its production from only 65,000 carats in 1945 to 370,000 carats last year, 65% industrial; South West Africa turned out 156,000 carats in 1945 whereas last year production was 700,000 carats, with 20% industrials. These statistics are typical of the giant strides being taken by the African diamond producers to keep pace with consumption. Brazilian production has declined officially over the past 10 years, but Brazilian figures are estimates only due to rather vague control by the Brazil government. In general, the supply outlook for wire mills is for sufficient stocks of diamonds to be on hand at or available to legitimate dealers and manufacturers to take care of all legitimate needs.

★ ★ ★

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made a fanfare about the discovery of diamonds in Siberia. Inasmuch as we have no idea as to the concentration of the ore, the cost of production or whether the Russians will try to use diamond exports as an economic weapon, it is impossible to assess the possible effects of this discovery on world diamond supply. The Russians themselves anticipate not less than a five-year period before there will be any production to speak of, so for the time being this must be left as a rather nebulous imponderable.

★ ★ ★

Of course everyone with even the slightest association with diamonds has had his imagination fired by the production of synthetic diamonds, and speculates as to their ultimate effect on the market. General Electric, having accomplished this remarkable achievement, is now aiming for quantity production at a marketable price. How close they are to attaining this end is still shrouded in secrecy. No important person in the natural diamond industry with whom I have spoken anticipates that with the tremendous pressures, temperatures and related physical problems involved in the manufacture of synthetic diamonds, their price will ever be so low as to put an end to the mining of natural diamonds. More than likely the two industries will ultimately exist side by side. Of course in such a case the principal benefit will be to industries using diamonds, of which the wire mill is such a significant part.

Zirconium

(*Continued from page* 1449)

smoother finishes. Feeds up to 15" per minute with a 12" diameter face mill will produce even smoother finishes. Slab milling should be done by the climb milling technique. The work should be rigidly supported and the machine tools should be in better than average condition for best results.

★ ★ ★

Although zirconium and its alloys are presently committed almost entirely to nuclear energy applications, its easy fabricability, high corrosion resistance, and other unique properties, make zirconium an outstanding engineering material which is certain to find wide civilian applications in chemical, food processing and pharmaceutical applications.

Draw-Pak

(*Continued from page* 1458)

ing a screw.

★ ★ ★

Note that because the Capstans, in any of the positions shown, do not accumulate wire, the problems of push-up or block shape are greatly minimized. A much wider range of wire sizes may be processed with the overhead position.

★ ★ ★

"W" shown in Figure #6 is the "loop diameter" or "wire line" which is the direct result of the lineal speed ratio of the Capstan to the Turntable. To establish a wire line, consideration must be

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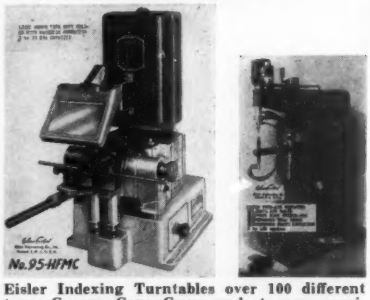

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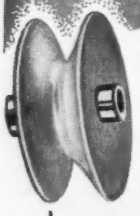

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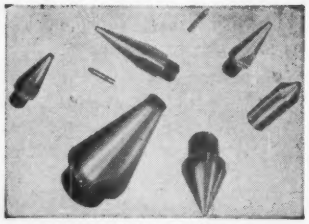

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given to the type of material to be processed, the container construction and speed of operation. You will notice the diametral variance of the wire line on the high-speed side as opposed to the low. Considering the speed and container construction, the calculated wire line allows the centrifugal forces on the coiled hanks of wire to become arrested on the inside wall surface of the container which is the strongest part of the container construction. As the wire fills the container, a space will exist between the bore of the coil and the outside surface of the container core. Using the same container construction at speeds producing a reduced amount of centrifugal forces on the wire, the wire line may be adjusted or varied so that the loop diameter will attempt to touch the furthest outer core surface and the inner container surface simultaneously.

★ ★ ★

This paper has reviewed Draw-Pak Capstan positions and wire lines with respect to the containers and adapters used for processing. inter-plant handling, shipping and dispensing. Many other practices in the use of this process effect the closer realization of "continuous operation" for both producer and user.

★ ★ ★

The speed ratio between Capstan and Turntable may be varied during pay-in to obtain a layer wind effect. The speed may be graduated to yield hanks of various predetermined diameters. This practice permits the utilization of more of the container volume and is particularly well suited to coarse stranded materials which are to be paid-out slowly by rotating the package.

★ ★ ★

Where a Guide is used to direct the wire into a container, it may be traversed to direct the lay of the wire filling more densely the annular space of the container.

★ ★ ★

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rest. The coil thus obtained is the one which may be paid-out uniformly free of tension variations.

Color Code Chart Issued by Kaiser

A handy chart identifying the Aluminum Association color codes for aluminum rod, bar and wire alloys has been published by **Kaiser Aluminum & Chemical Sales, Inc.**

★ ★ ★

Of special interest to fabricators, the chart lists 32 alloys and their respective color codes which were recently adopted by the Aluminum Association for use throughout the country. It also depicts Kaiser Aluminum color coding for identification tags on wire alloys.

★ ★ ★

The "Rod, Bar & Wire Color Chart" is designed as a quick reference wall chart or for insertion in a three-ring binder. It is available upon request to Kaiser Aluminum & Chemical Corporation, Consumer Service Division, Room 1156, 1924 Broadway, Oakland 12, California.

Two Improved Spring Wires Introduced

Two new spring wires — trade named Trucoat and Micro-Tin — have been put into quantity production by **National Standard Co.**, Niles, Mich.

★ ★ ★

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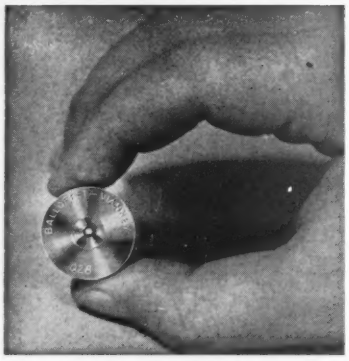

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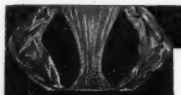

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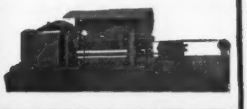
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(*Continued from page* 1452)

3. Physical, Chemical and Electrical Properties of Marlex Ethylene Polymers, R. V. Jones, P. J. Boeke and W. R. Clark. "*Wire* and Wire Products," June, 1956, pages 661-2, 717-19.

4. Properties of Marlex 50 Ethylene Polymer, R. V. Jones and P. J. Boeke, "Industrial and Engineering Chemistry," July, 1956, pages 1155-60.

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Youngstown Sheet & Tube Company, The 1438

WHERE TO BUY

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.
Only advertisers who have contracted for six or more insertions are listed in this section.

ABRASIVES—
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Norton Co., Worcester, Mass.

ACID INHIBITORS—
(See Inhibitors, Pickling)

ADJUSTABLE SPEED DRIVES—
The Louis Allis Company, Milwaukee, Wisc.

ANNEALING MACHINES — Electric Resistance
Syncro Machine Co., Perth Amboy, N. J.

ANNEALING POTS AND BOXES—
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

BAKERS—
(See OVENS—Rod Bakers)

BOBBINS—Braider & Wire Weaving
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg C., Attleboro, Mass.
Carter & Co., Ltd., B. & F., Bolton, England.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Plastic Mold Engineering Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

BORAX—Wire Drawing
United States Borax & Chemical Corp., Pacific Coast Borax Co. Div., New York, N. Y.

BORON CARBIDE—
Norton Co., Worcester, Mass.

CABLE FILLERS—Paper
Plymouth Cordage Company, Plymouth, Mass.

CAPSTANS—for Wire
Litzler, C. A. Co., Inc., Cleveland, Ohio.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Carter & Co., Ltd., B. & F., Bolton, England.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

CASTINGS—Wire Mill
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Phila., Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Parkin Chemical Co., The, Pittsburgh, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

CLEANING & PICKLING EQUIP.—
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee Engr. Co., Cleveland, Ohio
Youngstown Welding & Eng'g Co., Youngstown

CLOTH—WIRE, All Metals
Baker, James S., (Imports) Co., 311 California St., San Francisco, Calif.
Chase Brass & Copper Co., Waterbury, Conn.
Wickwire Bros., Cortland, N. Y.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Homer, N. Y.
Pennsylvania Salt Mfg. Company, Philadelphia, Pa.
Standard Industrial Compounds Co., Frankfort, Ill.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.
Miller, R. H. Co., Inc., Homer, N. Y.

COMPOUNDS—Diamond (Pre-Mixed)
Eastern Carbide Corp., New Rochelle, N. Y.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago
Rusch Wire Die Corporation, Croton-on-Hudson, N. Y.
Union Wire Die Corp., New York, N. Y.

COMPOUNDS—Extrusion for Wire
Electronic Rubber Co., Stamford, Conn.
Monsanto Chemical Company, Plastics Division. Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.

COMPOUNDS—For Improving Drawing & Extrusion
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Electronic Rubber Company, Stamford, Conn.

COMPOUNDS—Phosphate Coating
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corporation, Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

COMPOUNDS—Vinyl
Electronic Rubber Company, Stamford, Conn.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H. Co., Inc., Homer, N. Y.
Pennsylvania Salt Mfg. Company, Philadelphia, Pa.
Rome Soap Manufacturing Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Swift & Company, Chicago, Ill.
United States Borax & Chemical Corp., Pacific Coast Borax Co. Div., New York, N. Y.

CONDUCTORS—Flexible, Electrical
Montgomery Co., The, Windsor Locks, Conn.

CONTAINERS—Wire Packaging
(See DRUMS—Wire Packaging)

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Carter & Co., Ltd., B. & F., Bolton, England
Mossberg Pressed Steel Corp., Attleboro, Mass.
Plastic Mold & Engineering Co., Providence, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket. R. I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

COUNTERS—
(See MACHINERY—Measuring Wire and Cable)

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit.
Vascoloy-Ramet Corp., Waukegan, Ill.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Somerville, Mass.
Robinson, M. W. Co., Rockfall, Conn.

DIAMONDS—Industrial
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Molina-Straus Diamond Products Co., New York, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS
Danforth, The C. W. Co., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
Molina-Straus Diamond Products Co., New York, N. Y.
National Research Company, St. Clair Shores, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Union Wire Die Corp., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDER RECLAIMING—
Danforth, The C. W. Co., Youngstown, Ohio
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
National Research Co., St. Clair Shores, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Union Wire Die Corp., New York, N. Y.

DIAMOND TOOLS—
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio
Molina-Straus Diamond Products Co., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Cold Heading
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Union Wire Die Corp., New York, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.

DIES—Diamond
Ajax Industrial Supplies, Inc., Ft. Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., New Brunswick, N. J.
Ft. Wayne Wire Die Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Union Wire Die Corp., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES DIAMOND—Drawing Angle Controlled
Hoosier Wire Die, Inc., Ft. Wayne, Ind.

DIES DIAMOND—Reversible
National Wire Die Co., New York, N. Y.

DIES—Extrusion
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., New Brunswick, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit.
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Union Wire Die Corp., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.

DIES—Swaging
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Hoosier Wire Die., Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRIVES—Electric, Adustable Speed
The Louis Allis Company, Milwaukee, Wisc.

DRUMS—Wire Packaging
Continental Can Company, Van Wert, Ohio

DRUMS & TRAVERSES—For Cable Reels
Hubbard Spool Co., Garrett, Ind.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

DRYING EQUIPMENT—
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.

ENGINEERS—Consulting
Insulating Mach'y—Entwistle, Jas. L., Co., Cranston, R. I.
Lubricants—Hans C. Bick, Inc., Reading, Pa.
Wire Mill—Clarence S. Arms, Worcester, Mass.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

FREQUENCY CHANGERS—
The Louis Allis Company, Milwaukee, Wisc.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Galvanizing Equipment
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating
Carl Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Resistance Heating, Strand
Trauwood Engineering Co., The, Cleveland, O.

FURNACES—Salt Bath
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Strand Annealing
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Trauwood Engineering Co., The, Cleveland, O.

GAUGES—Wire Diameter, Continuous
Industrial Gauges Corporation, West Englewood, N. J.

GALVANIZING EQUIPMENT—(See MACHINERY—Galvanizing Wire)

GEARMOTORS—
The Louis Allis Company, Milwaukee, Wisc.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

GUIDES—For Wire
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HARDSURFACING ALLOYS—
(See Alloys—Hardsurfacing)

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Kellogg Company, M. W., Chemical Manufacturing Division, Jersey City, N. J.

INSULATING MATERIALS—
Celanese Corporation of America, New York, N. Y.
Chemical Products Co., E. Providence, R. I.
duPont de Nemours Co., (inc.), E. I., Polychemical Dept., Wilmington, Delaware
Electronic Rubber Co., Stamford, Conn.
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plymouth Cordage Company, Plymouth, Mass.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

INSULATING MATERIALS—Paper (For Electric Wire Cable)
Plymouth Cordage Company, Plymouth, Mass.

LACQUERING SYSTEMS—See MACH.—Lacquering Electric Wire

LACQUERS—For Electric Wire
Chemical Products Co., E. Providence, R. I.

LAGGING—Reel
North Anson Reel Co., No. Anson, Me.

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The, Philadelphia and Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Rome Soap Mfg. Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Bick, Hans C., Inc., Reading, Pa.
Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.
Wafios, Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Bobbin Winders
Cedar West Tool Inc., New York, N. Y.
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Braiding
Carter & Co., Ltd., B. & F., Bolton, England
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)

MACHINERY—Centerless Grinding & Polishing
American Laubscher Corporation, New York, N. Y.

MACHINERY—Chain Making
Nilson, A. H. Machine Co., Bridgeport, Conn.
Wafios Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Closing Rope
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Cold Heading
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Coil Wrapping (Paper)
McLaurin-Angier Co., Framingham, Mass.

MACHINERY—Copper Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
National Mach'y Exch (Used), New York
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Herborn, Germany

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
Metallurgical Products Dept. of General Electric Co., Detroit
Union Wire Die Corp., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

Michigan Oven, Company, Detroit, Mich.
Rockwell Co., W. S., Fairfield, Conn.

MACHINERY—Extruding

Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Prodex Corp., Fords, N. J.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Fence

Glader, Wm., Machine Works, Chicago, Ill.

MACHINERY—Flat Wire

Fenn Manufacturing Co., Newington, Conn.
Mettler Machine Tool, Inc., New Haven, Conn.
Rockwell, W. S. Co., Fairfield, Conn.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming Wire

Baird Machine Co., Stratford, Conn.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Wafios Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Galvanizing Wire

Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders

Entwistle Manufacturing Corporation, Providence, R. I.
Federal Mfg. Co., Wallingford, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding

Norton Co., The, Worcester, Mass.

MACHINERY—Insulating Wire

American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lacquering Electric Wire

American Insula'ing Mach'y Co., Philadelphia
Cook Mfg. Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, O.
Michigan Oven Company, Detroit, Mich.

MACHINERY—Lock Washer

Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving

Cedar West Tool Inc., New York, N. Y.
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland
Wafios Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Material Handling

(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable

Durant Mfg Co., Milwaukee, Wis.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack

Baird Machine Co., The Stratford, Conn.
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Packaging Wire

Coulter & McKenzie Machine Co., Bridgeport, Conn.

MACHINERY—Pin Making

Baird Machine Co., The, Stratford, Conn.

MACHINERY—Plating

Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing

Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York,
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Printing on Electric Wire

Gillies, Duncan M. Co., Inc., Boylston, Mass.

MACHINERY—Pumps for Molten Metal

Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Re-Spooling

Emory, Robert J., Co., Newark, N. J.
Federal Manufacturing Company, Wallingford, Conn.
International Wire Products Corp., Woodside Machinery Division, Midland Park, N. J.
National Mach'y Exch. (Used), New York N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J
Wire Insulating Machinery Inc., Northboro, Mass.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill

Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill

Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Insulating

Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Serving

Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Spark Testing

Entwistle, Jas. L., Co., Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spring Making

National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Staple

Nilson, A. H. Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Straightening & Cutting

Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Patterson Machine, Geo. C., Co., Cleveland, Ohio
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Stranding

Carter & Co., Ltd., B. & F., Bolton, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
Milton Machine Works, Inc, Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Stripping Electric Wire & Cable

Burdwood, Howard A., Inc., Portland, Maine

MACHINERY—Swaging

Fenn Manufacturing Co., Newington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out

American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Standard Mill Supply Co., Pawtucket, R. I.
Trauwood Engineering Co., The, Cleveland, O.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J

MACHINERY—Taping

American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing Magnet Wire Coatings for Pin Holes

Federal Mfg. Co., Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.

MACHINERY—Testing, Physical

Scott Testers, Inc., Providence, R. I.

MACHINERY—Tinning Wire

American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Tinsel Rolling Mills

American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire

Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing

Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Turks Head

Fenn Manufacturing Co., Newington, Conn.

MACHINERY—Twinning

(See Mach.—Bunching)

MACHINERY—Twisters, Wire

Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used

National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—Welded Wire Mesh

E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland

MACHINERY—for Wire Welding

(See WELDERS—Butt and Spot and Machinery —Welding Wire Fabrics)

MACHINERY—Winding Wire

Emory, Robert J., Newark, N. J.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
Hobbs Manufacturing Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.
Wire Insulating Machinery Inc., Northboro, Mass.

MACHINERY—Wire Drawing

Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Federal Mfg. Co., Wallingford, Conn.
Fenn Mfg. Co., Newington, Conn.
Herborn, Herborn, Germany
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Morgan Construction Co., Worcester, Mass.
Morgardshammers Mek Verstads AB, Morgardshammer, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Wire Forming
Baird Machine Co., The, Stratford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
Carter & Co., Ltd., B. & F., Bolton, England
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
Larmuth (1947) Ltd., Swinton, England
McLaurin-Angier, Framingham, Mass.
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MOTORS—Electric, A.C. & D.C.
The Louis Allis Company, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
Rockwell, W. S. Co., Fairfield, Conn.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAPER—Creped Wrapping
Arkell Safety Bag Company, New York, N. Y.
McLaurin-Angier Co., Framingham, Mass.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Arkell Safety Bag Company, New York, N. Y.
McLaurin-Angier Co., Framingham, Mass.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—Insulating
Plymouth Cordage Company, Plymouth, Mass.

PATENT—ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PLASTICIZERS—
Celanese Corporation of America, New York, N. Y.
Monsanto Chemical Company, Plastics Division, St. Louis, Mo.

PLASTICS COMPOUNDING—Custom
Electronic Rubber Company, Stamford, Conn.
Plandex Corporation, Downingtown, Pa.

PLASTICS—for Wire Insulation
Celanese Corporation of America, New York, N. Y.
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Electronic Rubber Co., Stamford, Conn.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plandex Corporation, Downingtown, Pa.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

POINTING WIRE
Main, Robert A. & Sons, Inc., Paramus, N. J.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio

PRINTING WHEELS—for Electric Wire
Gillies, Duncan M. Co., Inc. Boylston, Mass.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

PUMPS—Molten Metal
Fisher Associates, New York, N. Y.

REEL AND TENSION STANDS—
Industrial Ovens, Inc., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
North Anson Reel Co., No. Anson, Me.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L. Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Garrett, Ind.
Mason Can Company, East Providence, R. I.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Co., New York, N. Y.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Mason Can Co., East Providence, R. I.
McCaskie, Inc., William, Westport, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Company, New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
North Anson Reel Co., No. Anson, Me.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
North Anson Reel Co., No. Anson, Me.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Crucible Steel Co. of America, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Chase Brass & Copper Co., Waterbury, Conn.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Titan Metal Manufacturing Co., Bellefonte, Pa.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—(See Reels & Spools)

SPOOLS—Braider, Wire
Plastic Mold & Engineering Co., Providence, R. I.

SPOOLS—Stamped Metal for Retail Wire Sales
Clark, J. L. Mfg. Co., Rockford, Ill.
Mason Can Company, East Providence, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS—INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.
Wire Equipment Mfg. Co., Trenton, N. J.

TOOLS—Wire Cutting
Porter, H. K., Inc., Somerville, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Adjustable Speed Drives)

TRAVERSES & DRUMS—For Reels
(See Drums & Traversers)

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VARNISHES & LACQUERS—for Electric Wire
Chemical Products Co., E. Providence, R. I.
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Shawinigan Resins Corporation, Springfield, Mass.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila, Pa.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.
Wire Insulating Machinery Inc., Northboro, Mass.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Corp., Newark, N. J.
Micro Products Co., Chicago, Ill.

WIRE—Aluminum
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Ball
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass and Bronze
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Bunched & Stranded, Copper
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Camden Wire Co., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Camden Wire Co., Inc., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
United Wire & Supply Corporation, Providence, R. I.

WIRE—For Electrical Conductors
Camden Wire Co., Camden, N. Y.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Flat, Fine
Montgomery Co., The, Windsor Locks, Conn.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
National Standard Company, Niles, Mich.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—High Carbon
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Manufacturers
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark N. J.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.
U. S. Steel Corp., N. Y., N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Metalizing
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
National-Standard Company, Niles, Mich.
Worcester Wire Works Div., National-Standard Company, Worcester, Mass.

WIRE—Needle
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Alloy
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
Malin & Co., The, Cleveland, Ohio
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Oil Tempered
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Pointed
Main, Robert A. & Sons, Inc., Paramus, N. J.

WIRE—Silver Plated Copper
Camden Wire Co., Camden, N. Y.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.

WIRE—Special Shapes
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
Titan Metal Manufacturing Co., Bellefonte, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Crucible Steel Co. of America, Pittsburgh, Pa.
Firth Sterling, Inc., Pittsburgh, Pa.
International Wire Products Corporation, Woodside Machinery Division, Midland Park, N. J.
National Lock Washer Company, The, Newark, N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Steel—Also Coppered and Galvanized Steel
Alloy Metal Wire Div., H. K. Porter Company, Inc., Prospect Park, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
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B. F. Goodrich Chemical Co.
Div. of B. F. Goodrich Company
Cleveland, Ohio

ZAPFFE, CARL A., Metallurgist
Baltimore, Md.

ZUCKER, LEONARD A., Pres.
Union Wire Die Corp.
New York, N. Y.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

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ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE AND MASTICATING MACHINERY MANUFACTURERS

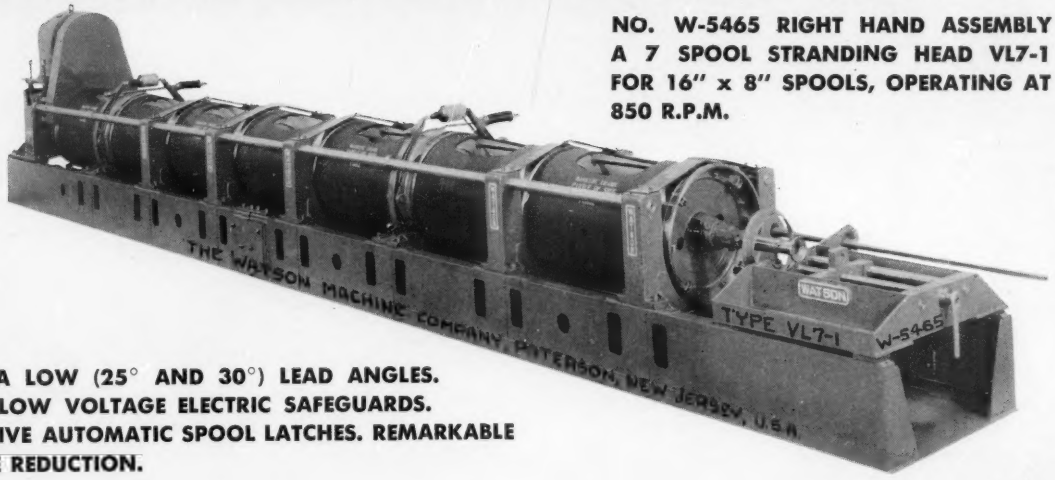
WATSON

EXTRA HIGH SPEED STRANDERS TYPE "VL"

U. S. Patents 2,270,093, 2,442,817 & 2,690,642

THIS OUTSTANDING DESIGN REPRESENTS THE ULTIMATE IN EFFICIENT PERFORMANCE UNDER THE MOST SEVERE OPERATING CONDITIONS. IT IS NOW AVAILABLE IN ALL SIZES AND COMBINATIONS FOR SPOOLS FROM 5 TO 1000 POUND CAPACITY.

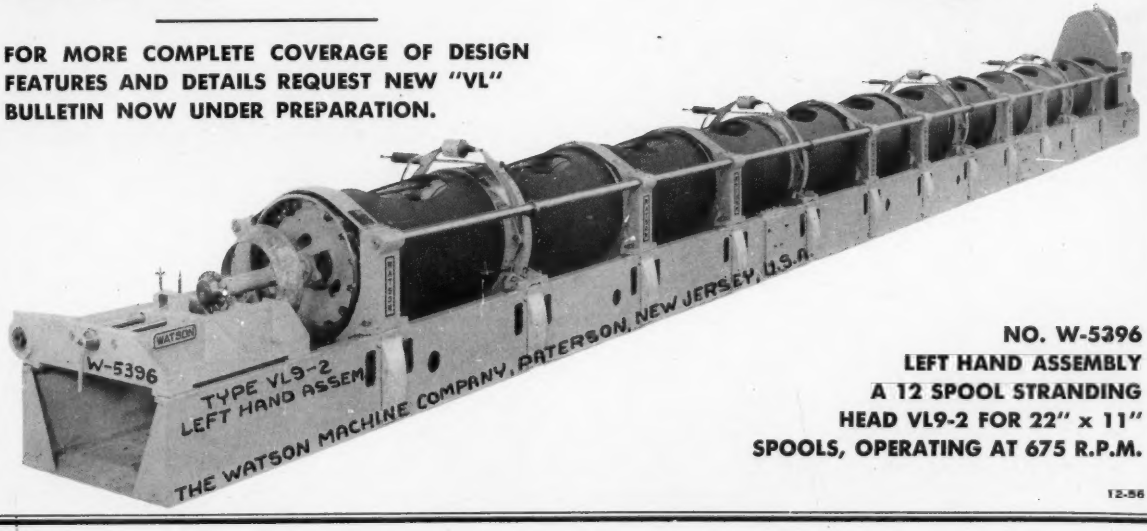
IN IT ARE COMBINED: HIGHEST POSSIBLE SAFE ROTOR SPEEDS. PATENTED NO-LOOSE-PART-INTEGRAL FRICTION "SHAFTLESS" CRADLES, WHICH REDUCE LOADING TIME TO A MINIMUM, ELIMINATE ACCIDENT HAZARDS AND CONTRIBUTE TOWARDS THE OPERATORS CONVENIENCE. A PRACTICALLY MAINTENANCE-FREE, PATENTED TUNGSTEN CARBIDE OR HARD CERAMIC WIRE GUIDE SYSTEM. A PATENTED "SPINNING" CRADLE NOSE CENTER GUIDE WHICH DISTRIBUTES WEAR AND GREATLY REDUCES OR ELIMINATES WIRE "CURLING".



NO. W-5465 RIGHT HAND ASSEMBLY A 7 SPOOL STRANDING HEAD VL7-1 FOR 16" x 8" SPOOLS, OPERATING AT 850 R.P.M.

EXTRA LOW (25° AND 30°) LEAD ANGLES.
NEW LOW VOLTAGE ELECTRIC SAFEGUARDS.
POSITIVE AUTOMATIC SPOOL LATCHES. REMARKABLE NOISE REDUCTION.

FOR MORE COMPLETE COVERAGE OF DESIGN FEATURES AND DETAILS REQUEST NEW "VL" BULLETIN NOW UNDER PREPARATION.



NO. W-5396
LEFT HAND ASSEMBLY
A 12 SPOOL STRANDING HEAD VL9-2 FOR 22" x 11" SPOOLS, OPERATING AT 675 R.P.M.

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FOR EVERY INDUSTRIAL HEAT TREATING PROCESS

We specialize in designing and building production furnaces; special atmosphere generators; time and labor saving material handling and other auxiliary equipment.

Fuel Fired and Electric Furnaces for processing strip, wire, tubing, stampings, castings, forgings and other ferrous and nonferrous products in any shape or form.

1957

JANUARY

SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

FEBRUARY

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
3	4	5	6	7	8	9
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17	18	19	20	21	22	23
24	25	26	27	28		

MARCH

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
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17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

APRIL

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

MAY

SUN	MON	TUE	WED	THU	FRI	SAT
			1	2	3	4
5	6	7	8	9	10	11
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19	20	21	22	23	24	25
26	27	28	29	30	31	

JUNE

SUN	MON	TUE	WED	THU	FRI	SAT
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23/30	24	25	26	27	28	29

JULY

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

AUGUST

SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
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18	19	20	21	22	23	24
25	26	27	28	29	30	31

1957

SEPTEMBER

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
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15	16	17	18	19	20	21
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29	30					

OCTOBER

SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5
6	7	8	9	10	11	12
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27	28	29	30	31		

NOVEMBER

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
3	4	5	6	7	8	9
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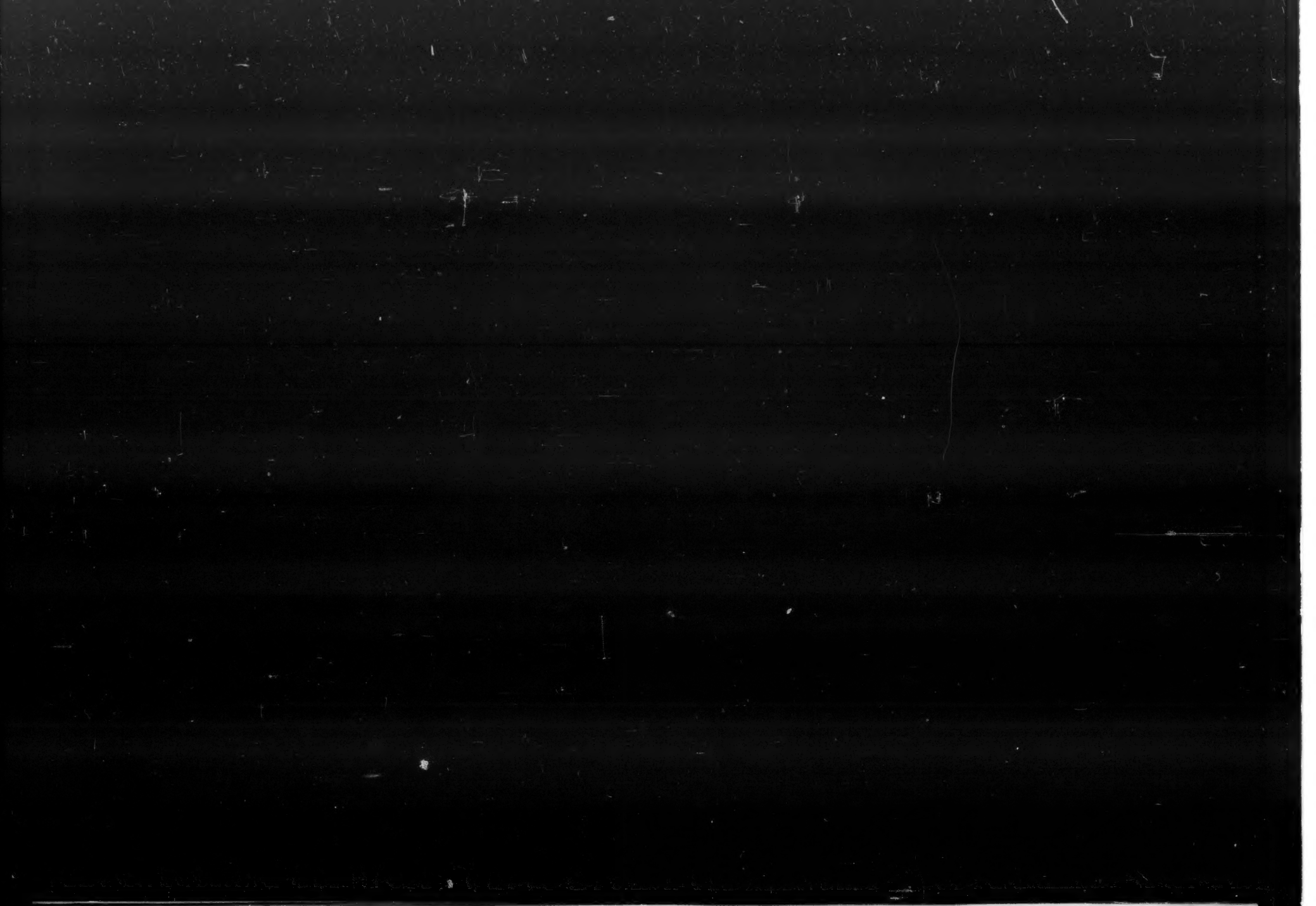
24	25	26	27	28	29	30

DECEMBER

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production

(Additional Calendars on 5" x 8" and 8½" x 11" card are available on request—Advise number and sizes desired)